ICOM

SERVICE MANUAL

VHF TRANSCEIVER

IC-F10

Icom Inc.

INTRODUCTION

This service manual describes the latest information for the **IC-F10** VHF TRANSCEIVER at the time of publication.

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 15 V. This will ruin the transceiver.
DO NOT expose the transceiver to rain, snow or any liquids.
DO NOT reverse the polarities of the power supply when connecting the transceiver.
DO NOT apply an RF signal of more than 20 dBm (100 mW) to the antenna connector. This could damage the transceiver's front end.

ORDERING PARTS

Be sure to include the following four points when ordering replacement parts:
1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

⟨SAMPLE ORDER⟩

1130007700	S. IC	BU4094BCF	IC-F10	MAIN UNIT	5 pieces
8810006790	Screw	PH No. 0 M2×3.5 ZK	IC-F10	Front panel	10 pieces

Addresses are provided on the inside back cover for your convenience.



REPAIR NOTES

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB to 50 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

EXPLICIT DEFINITIONS

VERSIONS

LMR (Land Mobile Radio)	USA version
PMR (Private Mobile Radio)	Other versions

FREQUENCY COVERAGE

L-band	136–150 MHz
H-band	146–174 MHz

CHANNEL SPACING

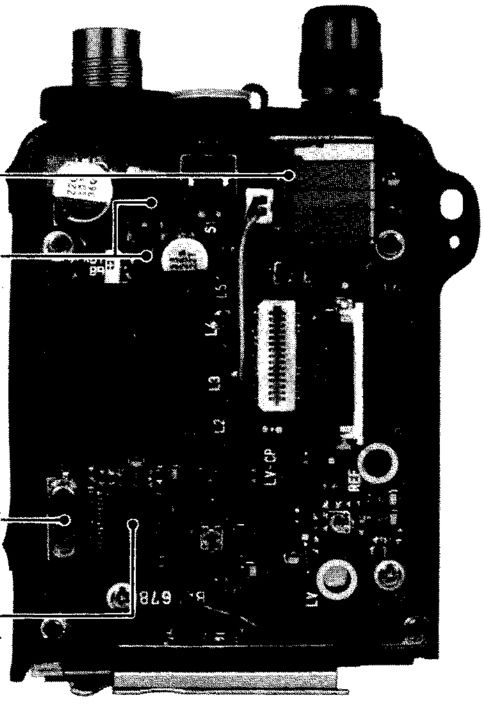
Narrow-type	12.5 kHz
Middle-type	20 kHz
Wide-type	25 kHz or 30 kHz

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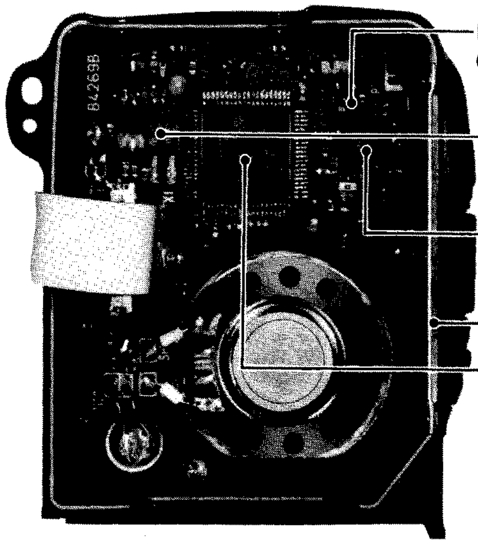
SECTION 1 SPECIFICATIONS

		LMR	PMR
GENERAL	Frequency coverage	136-150 MHz (L-band) 146-174 MHz (H-band)	
	Mode	16K0F3E	16K0F3E (Wide-type) 14K0F3E (Middle-type) 8K50F3E (Narrow-type)
	Number of channels	24 channels	
	Antenna impedance	50 Ω (nominal)	
	Usable temperature range	−30°C to +60°C (−22°F to +140°F)	−25°C to +55°C (−13°F to +131°F)
	Channel spacing	30 kHz	25 kHz (Wide-type) 20 kHz (Middle-type) 12.5 kHz (Narrow-type)
	Power supply requirement	7.2-12.0 V DC (acceptable BP-157A, BP-160, BP-174)	
	Current drain (at 12.0 V)	Receive standby: 70 mA max. audio: 300 mA Transmit high: 2.5 A low: 1.0 A	
	Dimensions (with BP-160)	57 (W)×125 (H)×35 (D) mm; 2-1/4 (W)×4-15/16 (H)×1-3/8 (D) in	
	Weight (incl. antenna, BP-160)	365 g/12.9 oz	
RECEIVER	Measurement method	EIA/TIA-316C	ETS300 086 or CEPT T/R24
	Receive system	Double conversion superheterodyne	
	Intermediate frequencies	1st: 21.80 MHz 2nd: 455 kHz	
	Sensitivity	0.35 µV for 12 dB SINAD	0.71 µV for 20 dB SINAD
	Squelch threshold sensitivity	0.35 µV	0.71 µV
	Adjacent channel selectivity	70 dB	70 dB (Wide-type, Middle-type) 60 dB (Narrow-type)
	Spurious response	70 dB	70 dB
	Image rejection	70 dB	—
	Intermodulation rejection	65 dB	65 dB
	Blocking or desensitization	—	84 dB
	Frequency tolerance	±0.0005%	±1.5 kHz
	Audio output power	350 mW with an 8 Ω load	
	Audio frequency response	−3 dB to +1 dB in a 6 dB/octave range	
	Noise and hum	40 dB	40 dB
TRANSMITTER	Measurement method	EIA/TIA-316C	ETS300 086 or CEPT T/R24
	RF output power (at 12.0 V)	4 W (high); 1 W (low)	
	Modulation system	Variable reactance frequency modulation	
	Max. frequency deviation	±5 kHz	±5 kHz (Wide-type) ±4 kHz (Middle-type) ±2.5 kHz (Narrow-type)
	Spurious emissions	−70 dB	0.25 µW
	Frequency tolerance	±0.0005%	±1.5 kHz
	Adjacent channel power	—	−70 dB (Wide-type, Middle-type) −60 dB (Narrow-type)
	Noise and hum	40 dB	40 dB
	Limiting of modulator	70% to 100% deviation	

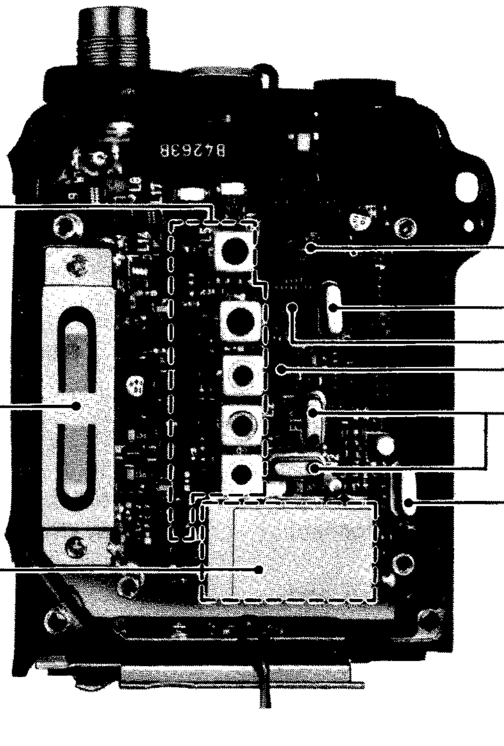
• **MAIN UNIT**



• **LOGIC-A UNIT**

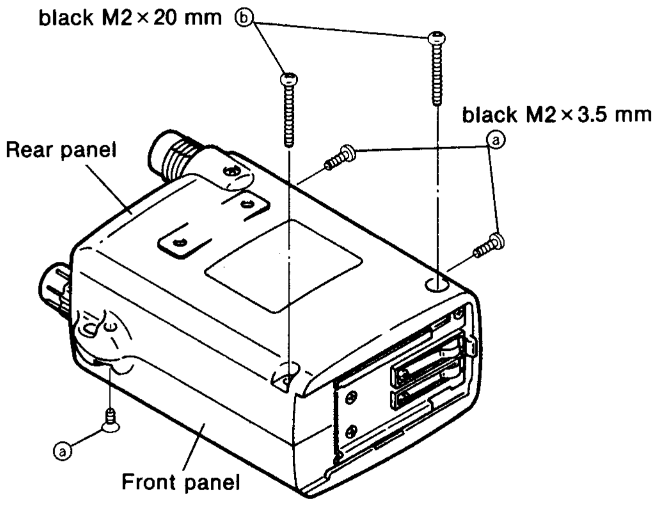


• **RF UNIT**



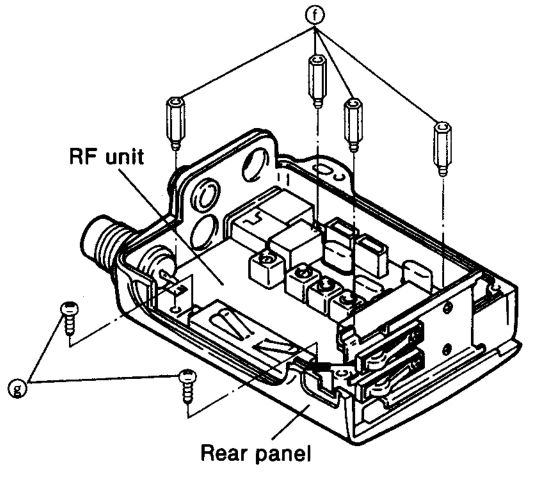
SECTION 3 DISASSEMBLY INSTRUCTIONS

• SEPARATING THE FRONT PANEL AND REAR PANEL



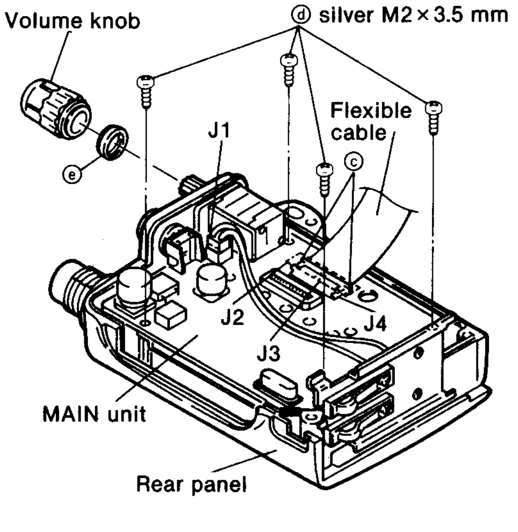
① Remove 3 screws ⓐ and 2 screws ⓑ to separate the front panel and the rear panel.

• REMOVING THE RF UNIT



④ Remove 4 stnad-offs ⓕ and 2 screws ⓖ.

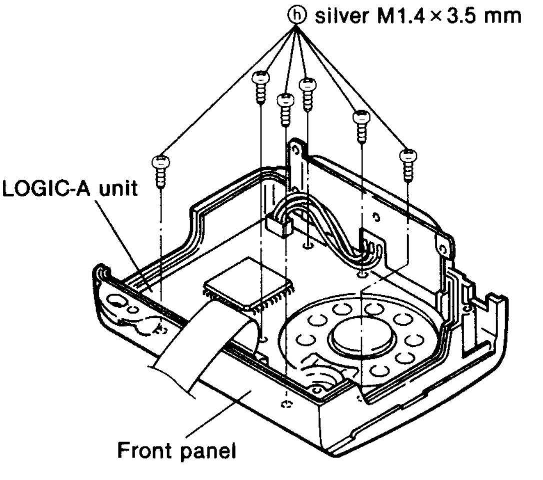
• REMOVING THE MAIN UNIT



② Unplug the connector J1.
Pull the points ⓒ of the connector J4, and disconnect the flexible cable.

③ Remove 4 screws ⓓ, pull the volume knob off and remove the VR nut ⓔ. Unplug connectors J2 and J3 at reversed side of the MAIN unit to remove it.

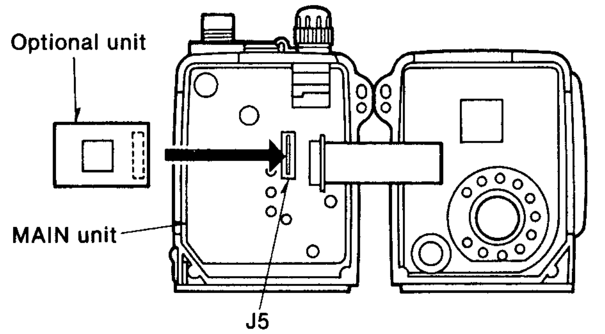
• REMOVING THE LOGIC UNIT



⑤ Remove 6 screws.
And then lift up the LOGIC unit.

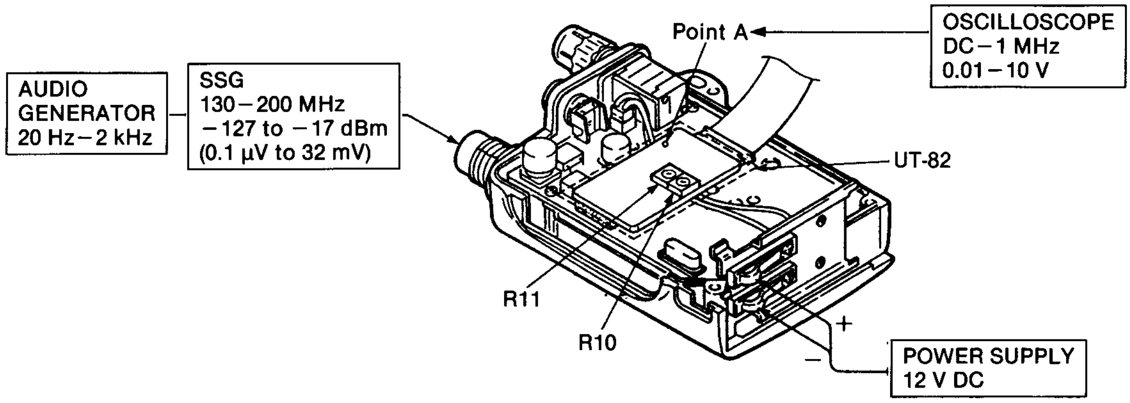
4-1 OPTION INSTALLATIONS

① Separate the front and rear panels as described in Section 3.
② Install one of optional units, UT-80, UT-96 or UT-97, to the connector (J5) as shown at right.



4-2 UT-80 2-TONE UNIT ADJUSTMENT

CONNECTION



	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT	
		UNIT	LOCATION		UNIT	ADJUST
1	• Operating channel: 2-tone decoder function programmed channel • Connect an SSG to the antenna connector and set as: Level : 1 mV (−47 dBm) Deviation : ±3.5 kHz (Wide-type) ±2.8 kHz (Middle-type) ±1.75 kHz (Narrow-type) Modulation: desired 1st tone frequency (refer to standard group below) • Receiving	UT-80	Connect an oscilloscope to the point A.	Maximum wave form	UT-80	R11
2	• Connect the SSG to the antenna connector and set as: Modulation: desired 2nd tone frequency					R10

STANDARD GROUPS FOR 2-TONE SEQUENTIAL SIGNALING

Group	0	1	2	3	4	5	6	7	8	9	DG
Group 1	330.5	349.0	368.5	389.0	410.8	433.7	457.9	483.5	510.5	539.0	569.1
Group 2	569.1	600.9	634.5	669.9	707.3	746.8	788.5	832.5	879.0	928.1	979.9
Group 3	1092.4	288.5	296.5	304.7	313.0	953.7	979.9	1006.9	1034.7	1063.2	569.1
Group 4	321.7	339.6	358.6	378.6	399.8	422.1	445.7	470.5	496.8	524.6	569.1
Group 5	553.9	584.8	617.4	651.9	688.3	726.8	767.4	810.2	855.5	903.2	979.9

4-3 UT-96 5-TONE UNIT/UT-97 DTCS UNIT ADJUSTMENT

Refer to page 6-3 transmitter adjustment.

SECTION 5 CIRCUIT DESCRIPTION

5-1 RECEIVER CIRCUITS

5-1-1 ANTENNA SWITCHING CIRCUIT (RF UNIT)

Received signals pass through a low-pass filter (L9, L8, L17, C37—C41, C125). The filtered signals are applied to the λ/4 type antenna switching circuit (L7, C35, C34, L6, D5, C105).

The antenna switching circuit functions as a low-pass filter while receiving. However, its impedance becomes very high while D5 is turned ON. Thus, transmit signals are blocked from entering the receiver circuits. The antenna switching circuit employs a λ/4 type diode switching system. The passed signals are then applied to the RF amplifier circuit.

5-1-2 RF CIRCUIT (RF UNIT)

The RF circuit amplifies signals within the range of frequency coverage and filters out-of-band signals.

The signals from the antenna switching circuit pass through a band-pass filter (L5, C32, D4, C31), and are then applied to the RF amplifier (Q3). The amplified signals are passed through the band-pass filter (L2—L4, D1—D3) to suppress unwanted signals.

D1—D4 employ varactor diodes that track the band-pass filters and are controlled by the PLL lock voltage. These diodes tune the center frequency of an RF passband for wide bandwidth receiving and good image response rejection.

5-1-3 1st MIXER AND 1st IF CIRCUITS (RF UNIT)

The 1st mixer circuit converts the received signal to a fixed frequency of the 1st IF signal with a PLL output frequency. By changing the PLL frequency, only the desired frequency will be passed through a pair of crystal filters at the next stage of the 1st mixer.

The signals from the RF circuit are mixed at Q2 with a 1st LO signal coming from the VCO board to produce a 21.80 MHz 1st IF signal.

After passing through the matching circuit (L1), the 1st IF signal is applied to a pair of crystal filters (FI2) to suppress out-of-band signals. The 1st IF signal is amplified at the IF amplifier (Q1) and applied to the 2nd mixer circuit (IC1 pin 16).

5-1-4 2nd IF AND DEMODULATOR CIRCUITS (RF UNIT)

The 2nd mixer circuit converts the 1st IF signal to a 2nd IF signal. A double superheterodyne system (which converts receive signals twice) improves the image rejection ratio and obtains stable receiver gain.

The 1st IF signal from Q1 is applied to the 2nd mixer section of IC1 (pin 16), and is mixed with the 2nd LO signal to be converted to a 455 kHz 2nd IF signal.

IC1 contains the 2nd mixer, 2nd local oscillator, limiter amplifier and quadrature detector circuits. The 2nd local oscillator section and X2 generate 21.345 MHz for the 2nd LO signal.

The 2nd IF signal (455 kHz) from the 2nd mixer (IC1 pin 3) passes through the ceramic filter (FI1) where unwanted signals are suppressed. It is then amplified at the limiter amplifier section (IC1 pin 5) and applied to the quadrature detector section (IC1 pins 10, 11 and ceramic discriminator X1) to demodulate the 2nd IF signal into AF signals.

AF signals output from IC1 (pin 9) passes through the CTCSS encoder/decoder IC (IC6 pins 1, 5) on the MAIN unit. When the CTCSS squelch is in use, the tone decoded signal ("LOW" when matched) is applied to CPU via pin 14. The AF signals are also applied to the connector for an optional unit. The noise detect (BUSY) signal output from IC1 (pin 13) is applied to the CPU (LOGIC unit; IC1 pin 28).

• 2nd IF AND DEMODULATOR CIRCUITS

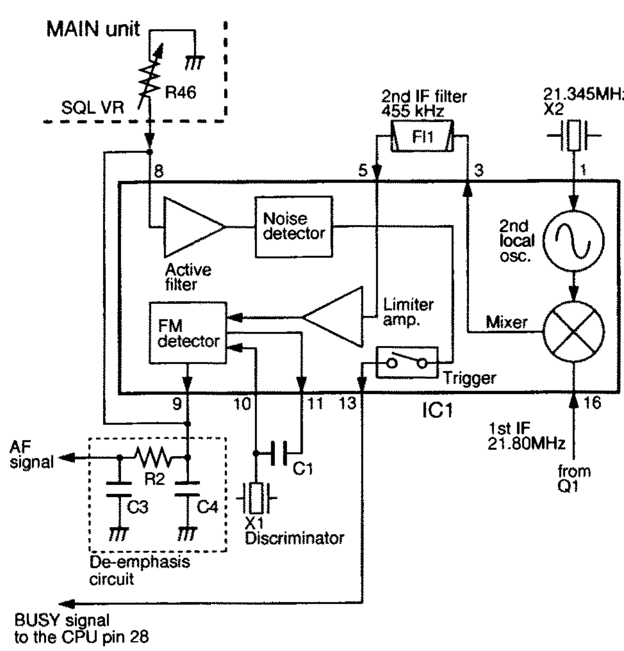


Fig. 1

5-1-5 AF AMPLIFIER CIRCUIT (MAIN UNIT)

The AF amplifier circuit, including an AF mute switch, amplifies the demodulated signal to drive a speaker.

The filtered signals pass through the AF mute switch (Q10) via the filter amplifier (Q6) and [VOL] control (VR board R1) and are then applied to the AF power amplifier (IC4 pin 4). AF signals are power-amplified at the AF power amplifier (IC4) to drive the speaker.

The AF amplifier regulator (Q8, Q9) supplies sufficient voltage to drive the AF power amplifier. The AFON signal from the data expander (IC3) controls Q9 to reduce the current drain while the squelch is closed.

• AF AMIPLIFIER CIRCUIT

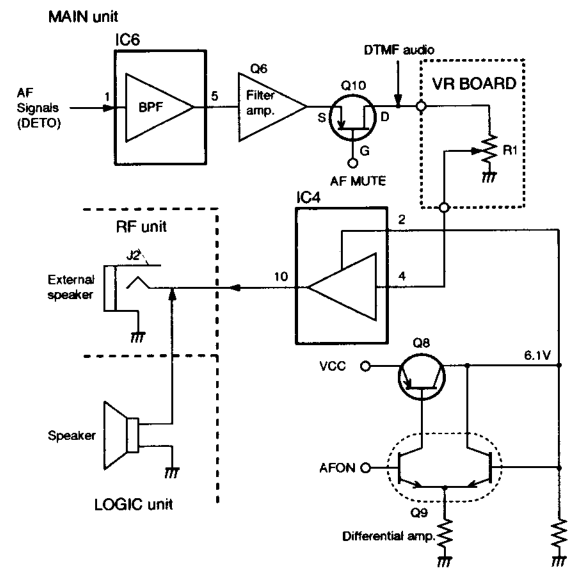


Fig. 2

5-1-6 SQUELCH CIRCUIT (RF UNIT)

A noise squelch circuit cuts out AF signals when no RF signal is received. By detecting noise components in the AF signal, the squelch circuit switches the AF mute switches.

Some of the noise components in the AF signal from FM IF IC (IC1 pin 9) are applied to IC1 pin 8 via C103. The SQL control (MAIN unit R46) adjusts the pin 8 input level.

The active filter section in IC1 amplifies noise components of frequency 20 kHz and above. Output signals are rectified and are converted to DC voltage in the noise detector section. And detected signals output to IC1 pin 13.

The signal is applied to the CPU (IC1 pin 28) on the LOGIC unit through the BUSY signal line. The CPU outputs an AF MUTE signal via the Data expander (IC3) to activate the AF mute switch (Q10).

5-2 TRANSMITTER CIRCUITS

5-2-1 MICROPHONE AMPLIFIER (MAIN UNIT)

The microphone amplifier circuit amplifies audio signals with +6 dB/octave pre-emphasis from the microphone to a level needed for the modulation circuit.

The AF signals from the built-in condenser microphone (LOGIC unit), or from the [EXT MIC] jack on the RF unit, are applied to IC1 (pin 16) via the mic mute switch (Q1), and are pre-emphasized to +6 dB/octave. IC1 functions as the microphone amplifier and the limiter.

The output signals from IC1 (pin 8) pass through the frequency deviation pot (R8) and are applied to the modulation circuit on the VCO board via the low-pass filter and AF amplifier.

Q6 on the LOGIC-A unit is the PTT control circuit, and outputs "High" to the CPU when transmitting.

5-2-2 MODULATION CIRCUIT (VCO BOARD)

The modulation circuit modulates the VCO oscillating signal (RF signal) using the microphone audio signals.

The "MOD" signal changes the reactance of a diode (D3) to modulate the oscillated signal at the VCO circuit (Q1, Q2, D2). The oscillated signal is buffer-amplified at Q3, and Q12 on the RF unit. The amplified signal passes through the transmit/receive switching circuit (D10, D9) on the RF unit and is then applied to the drive amplifier circuit.

5-2-3 DRIVE AMPLIFIER CIRCUIT (RF UNIT)

The drive amplifier circuit amplifies the VCO oscillating signal to the needed level at the power amplifier.

The signal from the transmit/receive switching circuit (D10) is amplified at the pre-drive amplifier (Q13) and is then amplified again at a drive amplifier (Q14).

5-2-4 RF POWER AMPLIFIER (RF UNIT)

IC3 is a power module which provides a stable 4 W (at DC 12.0 V) of output power.

The RF signal from the drive amplifier (Q14) is applied to the power amplifier (IC3 pin 1). The amplifier signal is output from IC3 (pin 5). The output signal is applied to the antenna connector through the APC detector circuit, the antenna switching circuit and the low-pass filter circuit.

5-2-5 APC CIRCUIT (RF UNIT)

The APC circuit protects the power module (IC5) from a mismatched output load and selects HIGH and LOW output power.

The APC detector circuit (L14, D11, D12) detects forward signals and rectified signals at D11 and D12 respectively. The combined voltage is at a minimum level when the antenna is matched at 50 Ω and is increased when it is mismatched.

The detected voltage is applied to a differential amplifier circuit (Q18a). The APC reference voltage is determined by the power output control circuit (MAIN unit Q16). The APC reference voltage is applied to the base of Q18b.

When the antenna impedance is mismatched, the base voltage of Q18a exceeds the reference voltage. The collector voltage of Q18a decreases.

The current from the differential amplifier circuit (Q18a, Q18b) is amplified at Q19, then controls the bias voltage of the power module (IC3) until the base voltage of Q18a reaches the same level as the voltage of Q18b.

• APC CIRCUIT

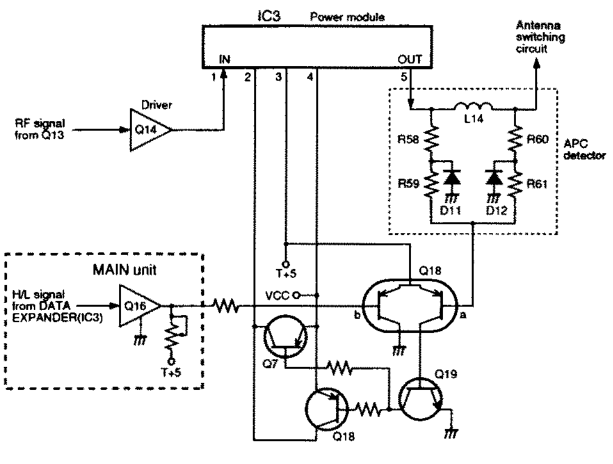


Fig. 3

5-3 PLL CIRCUITS

5-3-1 GENERAL

A PLL circuit provides stable oscillation of the transmit frequency and the receive local frequency. The PLL circuit compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by a crystal oscillator and the divided ratio (N-data) of a programmable divider.

5-3-2 PLL CIRCUIT (RF UNIT)

The PLL circuit, using a one chip PLL IC (IC2), directly generates the transmit frequency and receive 1st LO frequency with a VCO. The PLL IC sets the divided ratio based on serial data from the CPU on the LOGIC unit and compares the phases of a VCO signal and the reference oscillator frequency. The PLL IC detects the out-of-step phase and outputs it from pin 7.

5-3-3 REFERENCE OSCILLATOR CIRCUIT (RF UNIT)

A 12.8 MHz stable frequency is oscillated at X3 and Q17. The frequency is adjusted with C112. The frequency is divided by 2560 or 2048 to obtain the PLL reference frequency (5 kHz or 6.25 kHz).

5-3-4 PROGRAMMABLE DIVIDER AND PHASE DETECTOR CIRCUITS (RF UNIT)

The VCO generated signal (PLL LO signal) is amplified at Q9, and is applied to a PLL IC (IC2 pin 5). The PLL LO signal is divided at the programmable divider section and is then applied to the phase detector section.

The phase detector compares the input signal and the reference frequency, and outputs the out of phase signal (pulse signal) from pin 7.

• PLL CIRCUIT

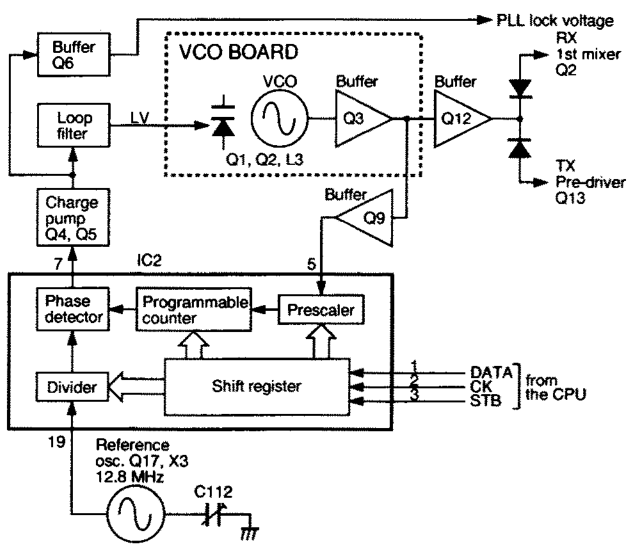


Fig. 4

5-3-5 CHARGE PUMP AND LOOP FILTER CIRCUITS (RF UNIT)

The phase detected signal is applied to the charge pump (Q4, Q5) and the lag-lead loop filter (R34, C53). The loop filter converts the pulse signal to DC voltage while increasing the DC voltage range.

5-3-6 VCO CIRCUIT (VCO BOARD)

The VCO circuit (Q1, Q2, D2) generates the transmit frequency and the receive 1st LO frequency. The varactor diode (D2) provides frequency control. The output signal from the collector of Q1 is buffer-amplified at Q3 and is then applied to the PLL IC (IC2 pin 5) through Q9. On the other hand, the output signal from the collector of Q3 is buffer-amplified at Q12 on the RF unit. These buffer amplifiers amplify VCO oscillation and do not permit subsequent circuits to affect the VCO oscillation. The amplified signal is applied to the transmit/receive switching circuit (D9, D10).

5-4 VOLTAGE LINES

LINE	DESCRIPTION
HV	This voltage is supplied from a battery pack (CONNECT board)
VCC	This voltage passes through the power switch with [VOL] control (R1) on the VR board and is then applied to the 5 V regulator circuit (MAIN unit). This VCC is used for the transmitter circuit.
+5	Common 5 V converted from the VCC line by the 5 V regulator circuit (Q4, Q5) using the reference regulator (IC2) on the MAIN unit.
R5S	Receive 5 V controlled at Q7 using the "R5SC" signal from IC3 on the MAIN unit. This voltage is used for power saver control in the receiver circuit.
T+5	5 V for transmitter circuit controlled by the "T5C" signal from the CPU (LOGIC unit). The "T+5" regulator circuit and consists of Q11, Q12 and D5 on the MAIN unit.

5-5 PORT ALLOCATIONS

5-5-1 CPU (LOGIC UNIT IC1)

PIN NO.	PORT NAME	DESCRIPTION
1	PSTB	Outputs strobe signals for serial data to the PLL IC (IC2) on the RF unit.
2	ISTB	Outputs strobe signals for serial data to the data expander IC (IC3) and the CTCSS IC (IC6) on the MAIN unit.
3	LMPO	Output port for the LCD backlight.
4	CLOT	Outputs cloning signal.
5	T5C	Outputs transmit/receive switching control signal. "HIGH": transmit
7	PTT	Input port for the [PTT] switch. "HIGH": Switch is pushed
8	VC REF	Reference voltage input terminal.
9	S SW	Input port for the [S] switch. "LOW": Switch is pushed.
10	KEY	Input port for the [F], [LIGHT], and [MONI] switches with different voltage.
22, 23—26	K03, KI0—KI3	Input ports for key return signal from the [PO] to [P3] switches.
27	TSQL	This port receives "LOW" when CTCSS IC (MAIN unit IC6) detects the tone.
28	BUSY/ UNLK	Input port for busy signal while receiving and unlock signal while transmitting. Note that R5SC is at "HIGH" while transmitting. Squelch open during Rx: "LOW" Squelch close during Rx: "HIGH" PLL unlocked during Tx: "HIGH" PLL locked during Tx: "LOW"
30	CLIN	Input port for cloning signal.
31—69	—	Output LCD drive signal.
70, 71	TONEC, TONER	Output a DTMF code signal.
76	RESET	Input port for reset signal. "Low" to "High": CPU reset
77	EECK	Outputs clock signal to the EEPROM (IC2).
78	EEDT	Data bus line for EEPROM (IC2).
79	CK	Outputs clock signal for data expander (MAIN unit IC3) and CTCSS IC (MAIN unit IC6).

5-5-2 DATA EXPANDER (MAIN UNIT IC3)

PIN NO.	PORT NAME	DESCRIPTION
1	STRB	Input port for a strobe signal from the CPU.
2	DATA	Input port for serial data from the CPU.
3	CLK	Input port for the clock signal from the CPU.
5	MMUTE	Outputs a microphone mute signal. "HIGH": Mic mute.
6	AFON	Outputs the AF power amplifier control signal. "HIGH": AF amplifier activates "LOW": AF amplifier deactivates
7	AFMUTE	Output port for the receive mute signal to cut the audio line.
10	SDATA	Outputs serial data to the CTCSS IC (IC6).
12	R5SC	Outputs an R5S control signal. Outputs "LOW" while receiving and the power saver does not function.
13	+5SC	Outputs a power save control signal. Outputs "LOW" while the power saver idles circuits.
14	LOW	Outputs a transmit high/low switching signal. "HIGH" for low power

SECTION 6 ADJUSTMENT PROCEDURES

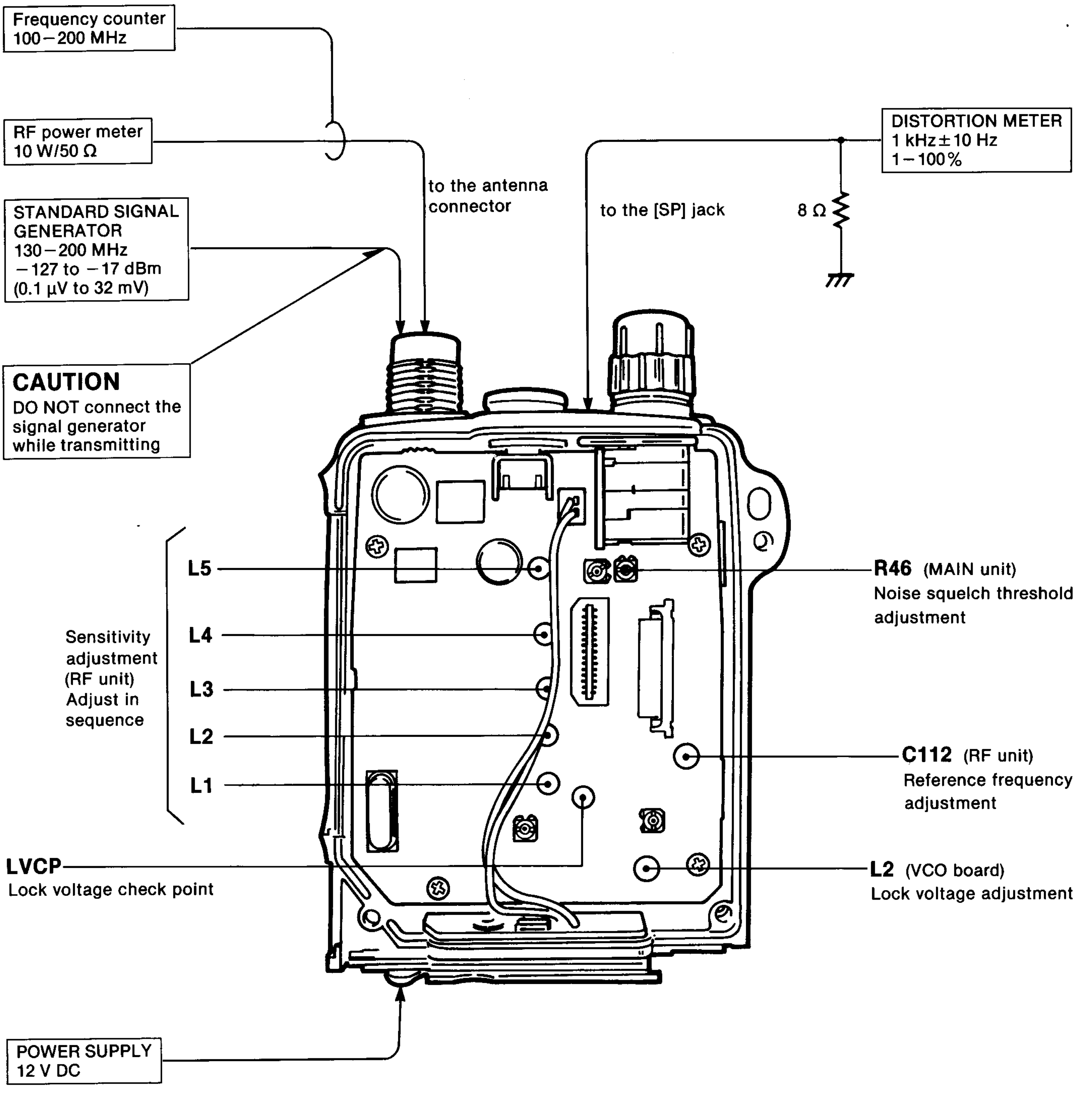
6-1 PLL ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
LOCK VOLTAGE	1	• Operating frequency: 136.000 MHz (L-band) 146.000 MHz (H-band) • Receiving	RF	Connect a digital multi-meter or oscilloscope to LVCP.	1.0 V	VCO	L2
REFERENCE FREQUENCY	1	• Operating frequency: 150.000 MHz (L-band) 174.000 MHz (H-band) • Connect the RF power meter or a 50 Ω dummy load to the antenna connector. • Transmitting	Top panel	Loosely couple the frequency counter to the antenna connector.	150.000 MHz (L-band) 174.000 MHz (H-band)	RF	C112

6-2 RECEIVER ADJUSTMENT

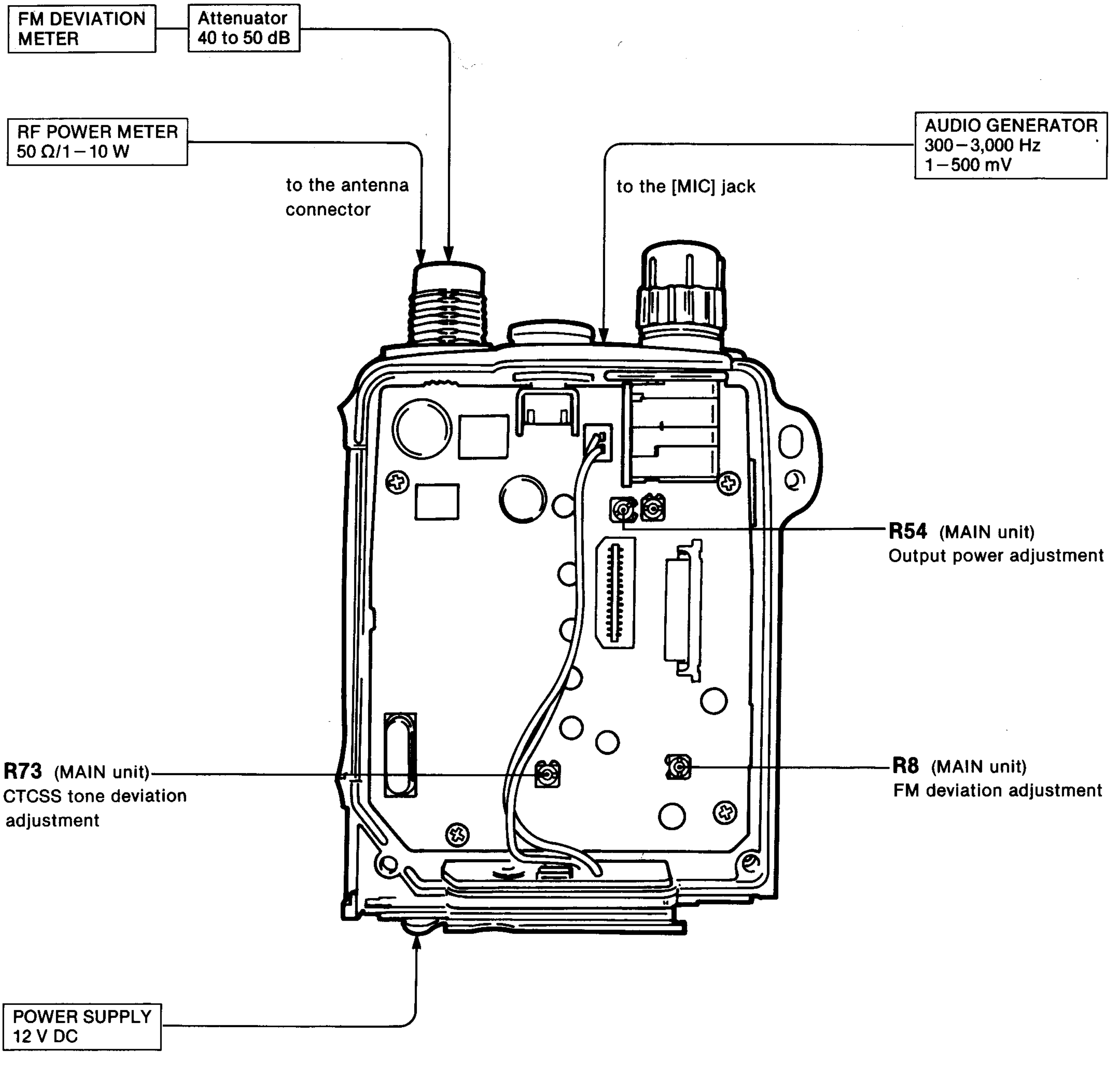
ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1	• Operating frequency: 136.000 MHz (L-band) 146.000 MHz (H-band) • Connect the SSG to the antenna connector and set as: Level : 1.0 mV* (−47 dBm) Deviation : ±3.5 kHz (Wide-type) ±2.8 kHz (Middle-type) ±1.75 kHz (Narrow-type) Modulation: 1 kHz • SQL : OFF	Top panel	Connect the distortion meter to the [SP] jack with an 8 Ω load.	Minimum distortion level	RF	Adjust in sequence. L5, L4, L3, L2
	2	• SSG set as Level : 0.1 V (−0.7 dBm)				RF	L1
NOISE SQUELCH	1	• Connect the SSG to the antenna connector and set as: Deviation : ±3.5 kHz (Wide-type) ±2.8 kHz (Middle-type) ±1.75 kHz (Narrow-type) Modulation: 1 kHz • R46 (MAIN unit): max. CCW • Receiving	Top panel	Connect a SINAD meter to the [SP] jack with an 8 Ω load.	8 dB SINAD	Top panel	SSG output
			Front panel	Speaker	Squelch just opens.	MAIN	R46

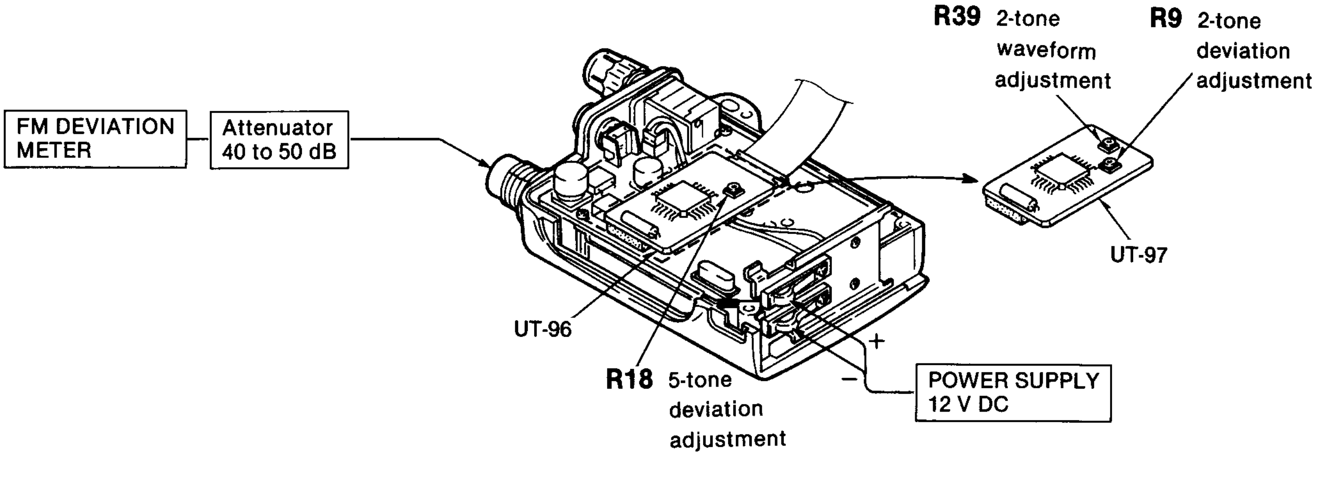
*This output level of the standard signal generator (SSG) is indicated as SSG's open circuit.


Frequency counter
100 – 200 MHz
RF power meter
10 W/50 Ω
STANDARD SIGNAL GENERATOR
130 – 200 MHz
– 127 to – 17 dBm
(0.1 μV to 32 mV)
CAUTION
DO NOT connect the signal generator while transmitting
to the antenna connector
to the [SP] jack
DISTORTION METER
1 kHz ± 10 Hz
1 – 100%
8 Ω
Sensitivity adjustment (RF unit) Adjust in sequence
L5
L4
L3
L2
L1
R46 (MAIN unit)
Noise squelch threshold adjustment
C112 (RF unit)
Reference frequency adjustment
LVCP
Lock voltage check point
L2 (VCO board)
Lock voltage adjustment
POWER SUPPLY
12 V DC

6-3 TRANSMITTER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1	• Operating frequency: 143.000 MHz (L-band) 160.000 MHz (H-band) • Transmitting • Output power : High	Top panel	Connect the RF power meter to the antenna connector.	4.0 W	MAIN	R54
FM DEVIATION	1	• Operating frequency: 136.000 MHz (L-band) 146.000 MHz (H-band) • Connect the FM deviation meter to the antenna connector and set as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Apply an AF signal to the [EXTMIC] jack. 1 kHz/170 mV (LMR) 1 kHz/120 mV (PMR) • Transmitting	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	Wide-type: ±4.1 kHz Middle-type: ±3.3 kHz Narrow-type: ±2.1 kHz	MAIN	R8
CTCSS TONE DEVIATION	1	• Operating frequency: 136.000 MHz (L-band) 146.000 MHz (H-band) • No signal applied to the [MIC] jack. • CTCSS tone frequency: 67.0 Hz	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	Wide-type: ±0.75 kHz Middle-type: ±0.55 kHz Narrow-type: ±0.3 kHz	MAIN	R73
2-TONE DEVIATION (UT-97 is required)	1	• Operating frequency: 143.000 MHz (L-band) 160.000 MHz (H-band) • Clone and set the DTCS code: "007". • Connect the FM deviation meter to the antenna connector via the attenuator and set as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Transmitting	Top panel	Connect the oscilloscope to the FM deviation meter.	Set the flat waveform 	UT-97	R39
	2			Connect the FM deviation meter to the antenna connector via the attenuator.	±0.75 kHz	UT-97	R9
5-TONE DEVIATION (UT-96 is required)	1	• Operating frequency: 143.000 MHz (L-band) 160.000 MHz (H-band) • Connect the FM deviation meter to the antenna connector via the attenuator and set as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Transmitting	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	Wide-type: ±3.5 kHz Middle-type: ±2.8 kHz Narrow-type: ±1.75 kHz	UT-96	R18


FM DEVIATION METER
Attenuator 40 to 50 dB
RF POWER METER 50 Ω/1 – 10 W
to the antenna connector
AUDIO GENERATOR 300 – 3,000 Hz 1 – 500 mV
to the [MIC] jack
R54 (MAIN unit) Output power adjustment
R73 (MAIN unit) CTCSS tone deviation adjustment
R8 (MAIN unit) FM deviation adjustment
POWER SUPPLY 12 V DC


R39 2-tone waveform adjustment
R9 2-tone deviation adjustment
FM DEVIATION METER
Attenuator 40 to 50 dB
UT-97
UT-96
R18 5-tone deviation adjustment
+
–
POWER SUPPLY 12 V DC

SECTION 7 PARTS LIST

[LOGIC-A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1140004810	S.IC	HD404618C92H
IC2	1190000260	S.IC	24LC08BTI/SN
IC3	1110003240	S.IC	S-80740SL-A4-T1
Q1	1590001330	S.TRANSISTOR	DTA114EU T107
Q2	1590000680	S.TRANSISTOR	DTC114EU T107
Q3	1530003280	S.TRANSISTOR	2SC4211-6-TR
Q4	1590000680	S.TRANSISTOR	DTC114EU T107
Q6	1510000880	S.TRANSISTOR	2SA1622-6-TR
D1	1750000390	S.DIODE	1SS353 TE-17
D2	1790001280	S.DIODE	MA111(TX)
X1	6060000260	CERAMIC	CSB800J220
R1	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R2	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R3	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R4	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R5	7030003370	S.RESISTOR	ERJ3GEYJ 271 V (270 Ω)
R6	7030003370	S.RESISTOR	ERJ3GEYJ 271 V (270 Ω)
R8	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R9	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R10	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R12	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R14	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R16	7030005470	S.RESISTOR	RR0816R-244-D (240 kΩ)
R17	7030005470	S.RESISTOR	RR0816R-244-D (240 kΩ)
R18	7030005460	S.RESISTOR	RR0816R-204-D (200 kΩ)
R19	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R20	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R22	7030005470	S.RESISTOR	RR0816R-244-D (240 kΩ)
R27	7030005470	S.RESISTOR	RR0816R-244-D (240 kΩ)
R28	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R29	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R30	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R31	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R32	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R33	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R36	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R37	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R38	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)
R39	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R40	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R41	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R42	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R43	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R44	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
C1	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C2	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C3	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C4	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C7	4550006210	S.TANTALUM	ECST1CX106R
C8	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C9	4550006210	S.TANTALUM	ECST1CX106R
C10	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C11	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C13	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C14	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C15	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C16	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C17	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C18	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C19	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A

[LOGIC-A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C20	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C21	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C22	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C23	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C24	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C25	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C26	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C27	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C28	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C29	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C30	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C31	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C32	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C33	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C34	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C35	4550006610	S.TANTALUM	ECST1CX685R
SP1	2510000770	SPEAKER	SV-36W08020G
DS1	5030000990	LCD	LD-BU5703J
DS2	5040001920	S.LED	SML-110MT T86
DS3	5040001920	S.LED	SML-110MT T86
MC1	7700001600	MICROPHONE	KUC2123-030245
W1	7030003860	S.JUMPER	ERJ3GE JPW V
W2	7120000380	JUMPER	JPW 01 R-01
W7	7120000380	JUMPER	JPW 01 R-01
W8	8900005430	CABLE	OPC-535 (N:24 L:60)
J2	6510017970	S.CONNECTOR	IL-FPR-U24S-HF-E3000
EP1	0910042624	PCB	B 4269D
EP3	8930034750	LCD CONTACT	SRCN-1556 ZSS

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110003410	S.IC	µPC5023GR-043-GJG-T2
IC2	1180001210	S.IC	S-81252PG-PL-T1
IC3	1130007700	S.IC	BU4094BCF-T1
IC4	1110001810	S.IC	TA7368F(TP1)
IC6	1130007220	S.IC	AK2341-T
IC7	1110002750	S.IC	TA75S01F (TE85R)
Q1	1590001450	S.FET	2SJ144-GR (TE85R)
Q2	1590000720	S.TRANSISTOR	DTA144EU T107
Q3	1590000660	S.TRANSISTOR	DTC144TU T107
Q4	1590001170	S.TRANSISTOR	XP1501-(TX).AB
Q5	1520000450	S.TRANSISTOR	2SB1132 T100 Q
Q6	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q7	1590001060	S.TRANSISTOR	DTA114TU T107
Q8	1520000650	S.TRANSISTOR	2SB1201-S-TL
Q9	1590001170	S.TRANSISTOR	XP1501-(TX).AB
Q10	1590001390	S.FET	2SJ144-Y (TE85R)
Q11	1530003280	S.TRANSISTOR	2SC4211-6-TR
Q12	1520000450	S.TRANSISTOR	2SB1132 T100 Q

S.=Surface mount

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
Q14	1590000660	S.TRANSISTOR DTC144TU T107
Q16	1590000430	S.TRANSISTOR DTC144EU T107
D1	1750000340	S.DIODE 1SS357 (TPHR3)
D2	1750000390	S.DIODE 1SS353 TE-17
D3	1750000390	S.DIODE 1SS353 TE-17
D4	1750000390	S.DIODE 1SS353 TE-17
D5	1750000390	S.DIODE 1SS353 TE-17
X1	6050008860	S.XTAL CR-465 SMD-49 3.6864MHz
R5	7030003620	S.RESISTOR ERJ3GEYJ 333 V (33 kΩ) [Wide]
	7030003620	S.RESISTOR ERJ3GEYJ 333 V (33 kΩ) [Middle]
	7030003610	S.RESISTOR ERJ3GEYJ 273 V (27 kΩ) [Narrow]
R6	7030003650	S.RESISTOR ERJ3GEYJ 563 V (56 kΩ)
R7	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R8	7310003550	S.TRIMMER MVR32HXBR N473
R9	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)
R10	7030003630	S.RESISTOR ERJ3GEYJ 393 V (39 kΩ)
R11	7030003550	S.RESISTOR ERJ3GEYJ 822 V (8.2 kΩ)
R12	7030003710	S.RESISTOR ERJ3GEYJ 184 V (180 kΩ)
R13	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ) [LMR Wide]
	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ) [PMR Wide]
	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ) [Middle]
	7030003690	S.RESISTOR ERJ3GEYJ 124 V (120 kΩ) [Narrow]
R14	7030003760	S.RESISTOR ERJ3GEYJ 474 V (470 kΩ)
R15	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R18	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω)
R19	7030003480	S.RESISTOR ERJ3GEYJ 222 V (2.2 kΩ)
R20	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R21	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R23	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R24	7030003200	S.RESISTOR ERJ3GEYJ 100 V (10 Ω)
R25	7030003340	S.RESISTOR ERJ3GEYJ 151 V (150 Ω)
R26	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R27	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R28	7030003470	S.RESISTOR ERJ3GEYJ 182 V (1.8 kΩ)
R29	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R34	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R35	7030003540	S.RESISTOR ERJ3GEYJ 682 V (6.8 kΩ)
R36	7030003550	S.RESISTOR ERJ3GEYJ 822 V (8.2 kΩ)
R37	7030003430	S.RESISTOR ERJ3GEYJ 821 V (820 Ω) [Wide]
	7030003430	S.RESISTOR ERJ3GEYJ 821 V (820 Ω) [Middle]
	7030003450	S.RESISTOR ERJ3GEYJ 122 V (1.2 kΩ) [Narrow]
R38	7030003800	S.RESISTOR ERJ3GEYJ 105 V (1 MΩ)
R39	7030003760	S.RESISTOR ERJ3GEYJ 474 V (470 kΩ)
R40	7030003550	S.RESISTOR ERJ3GEYJ 822 V (8.2 kΩ)
R46	7310003650	S.TRIMMER MVR32HXBR N103
R49	7030003740	S.RESISTOR ERJ3GEYJ 334 V (330 kΩ)
R51	7030003500	S.RESISTOR ERJ3GEYJ 332 V (3.3 kΩ)
R52	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R54	7310003550	S.TRIMMER MVR32HXBR N473
R55	7030003550	S.RESISTOR ERJ3GEYJ 822 V (8.2 kΩ)
R56	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R61	7030003320	S.RESISTOR ERJ3GEYJ 101 V (100 Ω)
R65	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R66	7030003720	S.RESISTOR ERJ3GEYJ 224 V (220 kΩ)
R67	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R68	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)
R69	7030003730	S.RESISTOR ERJ3GEYJ 274 V (270 kΩ)
R70	7030003530	S.RESISTOR ERJ3GEYJ 562 V (5.6 kΩ)
R71	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R72	7030003510	S.RESISTOR ERJ3GEYJ 392 V (3.9 kΩ)
R73	7310003550	S.TRIMMER MVR32HXBR N473
R74	7030003610	S.RESISTOR ERJ3GEYJ 273 V (27 kΩ) [Wide]
	7030003610	S.RESISTOR ERJ3GEYJ 273 V (27 kΩ) [Middle]
	7030003650	S.RESISTOR ERJ3GEYJ 563 V (56 kΩ) [Narrow]
R75	7030003740	S.RESISTOR ERJ3GEYJ 334 V (330 kΩ)

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
R76	7030003800	S.RESISTOR ERJ3GEYJ 105 V (1 MΩ)
R77	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R78	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R79	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R80	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)
R81	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)
R82	7030003500	S.RESISTOR ERJ3GEYJ 332 V (3.3 kΩ)
R83	7030003570	S.RESISTOR ERJ3GEYJ 123 V (12 kΩ)
R84	7030003490	S.RESISTOR ERJ3GEYJ 272 V (2.7 kΩ) [Wide]
	7030003490	S.RESISTOR ERJ3GEYJ 272 V (2.7 kΩ) [Middle]
	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ) [Narrow]
R85	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R86	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R87	7030003670	S.RESISTOR ERJ3GEYJ 823 V (82 kΩ)
C1	4030007130	S.CERAMIC C1608 CH 1H 101J-T-A
C2	4550006320	S.TANTALUM ECST0JY475R
C3	4030008650	S.CERAMIC C1608 JB 1H 332K-T-A [Wide]
	4030009970	S.CERAMIC C1608 JB 1H 182K-T-A [Middle]
	4030009970	S.CERAMIC C1608 JB 1H 182K-T-A [Narrow]
C4	4030007130	S.CERAMIC C1608 CH 1H 101J-T-A
C5	4030007120	S.CERAMIC C1608 CH 1H 820J-T-A [Wide]
	4030007120	S.CERAMIC C1608 CH 1H 820J-T-A [Middle]
	4030007140	S.CERAMIC C1608 CH 1H 121J-T-A [Narrow]
C6	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C7	4550006140	S.TANTALUM ECST1EY474R
C8	4030007150	S.CERAMIC C1608 CH 1H 151J-T-A
C9	4030008880	S.CERAMIC C1608 JB 1C 223K-T-A
C10	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C11	4030008880	S.CERAMIC C1608 JB 1C 223K-T-A
C12	4550006320	S.TANTALUM ECST0JY475R
C13	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C14	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C15	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C16	4510005630	S.ELECTROLITIC ECEV1EA330SP
C17	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C18	4550006150	S.TANTALUM ECST1CY105R
C19	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C20	4550006150	S.TANTALUM ECST1CY105R
C21	4550006360	S.TANTALUM ECST1VY104R
C22	4510005370	S.ELECTROLITIC ECEV1AA221P
C23	4550006320	S.TANTALUM ECST0JY475R
C24	4030008920	S.CERAMIC C1608 JB 1C 473K-T-A
C25	4550006200	S.TANTALUM ECST0JY106R
C26	4550006340	S.TANTALUM ECST1AY335R
C27	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C28	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C29	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C30	4550006580	S.TANTALUM ECST1AV686R
C31	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C32	4550006360	S.TANTALUM ECST1VY104R
C33	4550006320	S.TANTALUM ECST0JY475R
C34	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C35	4550006360	S.TANTALUM ECST1VY104R
C36	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C37	4030008920	S.CERAMIC C1608 JB 1C 473K-T-A
C38	4550006320	S.TANTALUM ECST0JY475R
C39	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C40	4550006130	S.TANTALUM ECST1VY224R
C41	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C42	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C43	4030008920	S.CERAMIC C1608 JB 1C 473K-T-A
C44	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C45	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C46	4550006320	S.TANTALUM ECST0JY475R
C47	4550006200	S.TANTALUM ECST0JY106R
C50	4030007050	S.CERAMIC C1608 CH 1H 220J-T-A
C51	4030007050	S.CERAMIC C1608 CH 1H 220J-T-A
C52	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C53	4550006200	S.TANTALUM ECST0JY106R
C54	4030007150	S.CERAMIC C1608 CH 1H 151J-T-A

S.=Surface mount

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C55	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C56	4550006320	S.TANTALUM	ECST0JY475R
C57	4550006150	S.TANTALUM	ECST1CY105R
C58	4550006150	S.TANTALUM	ECST1CY105R
C59	4030008910	S.CERAMIC	C1608 JB 1C 393K-T-A [Wide/H-band]
	4030008900	S.CERAMIC	C1608 JB 1C 333K-T-A [Wide/L-band]
	4030008910	S.CERAMIC	C1608 JB 1C 393K-T-A [Middle]
	4030008880	S.CERAMIC	C1608 JB 1C 223K-T-A [Narrow]
C61	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C64	4550006150	S.TANTALUM	ECST1CY105R
C65	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C72	4030008890	S.CERAMIC	C1608 JB 1C 273K-T-A
C73	4550006320	S.TANTALUM	ECST0JY475R
C74	4550006320	S.TANTALUM	ECST0JY475R
C75	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A
C76	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C77	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C78	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C79	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C80	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C81	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C82	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C83	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C84	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C85	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C86	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C87	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C88	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C89	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C90	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C91	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C92	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C93	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C94	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C95	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C96	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C97	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C98	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C99	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C100	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C101	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C102	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C103	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C104	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C105	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C106	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C107	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C108	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C109	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C110	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C111	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C112	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
W1	7030003860	S.JUMPER	ERJ3GE JPW V
W3	7030003860	S.JUMPER	ERJ3GE JPW V
W4	7030003860	S.JUMPER	ERJ3GE JPW V
W5	7030000010	S.JUMPER	MCR10EZHJ JPW (000)
W6	7030003860	S.JUMPER	ERJ3GE JPW V
J1	6510007080	CONNECTOR	PI28A-02M
J2	6510016420	S.CONNECTOR	4-175638-2
J3	6510016420	S.CONNECTOR	4-175638-2
J4	6510017980	S.CONNECTOR	IL-FPR-24S-HF-E3000
J5	6510016230	S.CONNECTOR	AXN330038
S1	2260000980	SWITCH	SKHHLP014A
EP1	0910042604	PCB	B 4267D

[VCO BOARD]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q2	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q3	1530002560	S.TRANSISTOR	2SC4403-3-TR
Q4	1590000430	S.TRANSISTOR	DTC144EU T107
D1	1790000620	S.DIODE	MA77(TW)
D2	1720000370	S.VARICAP	HVU350TRF
D3	1790000620	S.DIODE	MA77(TW)
D4	1790000620	S.DIODE	MA77(TW)
L1	6200001520	S.COIL	MLF2012D R82K-T
L2	6150004400	S.COIL	LS-493
L3	6200001630	S.COIL	ELJNC R10K-F
R2	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R3	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R4	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R5	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ) [H-band]
	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ) [L-band]
R6	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)[H-band]
	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω) [L-band]
R7	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ) [H-band]
	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ) [L-band]
R8	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R9	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R10	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R11	7030003370	S.RESISTOR	ERJ3GEYJ 271 V (270 Ω)
R12	7030003220	S.RESISTOR	ERJ3GEYJ 150 V (15 Ω)
R13	7030003220	S.RESISTOR	ERJ3GEYJ 150 V (15 Ω)
R14	7030003220	S.RESISTOR	ERJ3GEYJ 150 V (15 Ω)
R15	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R16	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
C1	4030009650	S.CERAMIC	C1608 CH 1H 240J-T-A [H-band]
	4030007060	S.CERAMIC	C1608 CH 1H 270J-T-A [L-band]
C2	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C3	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C4	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C5	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A [H-band only]
C6	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C7	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A [H-band]
	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A [L-band]
C8	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C9	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C10	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C11	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C12	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C13	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C14	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C15	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A [H-band]
	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A [L-band]
C16	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A [H-band]
	4030009550	S.CERAMIC	C1608 CH 1H 2R5B-T-A [L-band]
J1	6910008020	CONNECTOR	IPS-1323
EP1	0910042592	PCB	B 4266B

S.=Surface mount

[VR BOARD]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7210001440	VARIABLE	RK097111101NA (10KA)
EP1	0910042612	PCB	B 4268B

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION		
IC1	1110003490	S.IC	TA31136FN(D,EL)	
IC2	1110003420	S.IC	M64073GP 600G	
IC3	1150000960	IC	SC1142	[L-band]
	1150001550	IC	SC1301	[H-band]
Q1	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	
Q2	1580000360	S.FET	3SK177-T2B U73	
Q3	1560000430	S.FET	2SK302-GR (TE85R)	
Q4	1560000540	S.FET	2SK880-Y (TE85R)	
Q5	1530003010	S.TRANSISTOR	2SC4117-GR (TE85R)	
Q6	1560000540	S.FET	2SK880-Y (TE85R)	
Q7	1520000450	S.TRANSISTOR	2SB1132 T100 Q	
Q8	1520000450	S.TRANSISTOR	2SB1132 T100 Q	
Q9	1530002560	S.TRANSISTOR	2SC4403-3-TR	
Q11	1530002060	S.TRANSISTOR	2SC4081 T107 R	
Q12	1530002560	S.TRANSISTOR	2SC4403-3-TR	
Q13	1530002570	S.TRANSISTOR	2SC4405-3-TR	
Q14	1530002340	S.TRANSISTOR	2SC2954-T2B	
Q16	1590001060	S.TRANSISTOR	DTA114TU T107	
Q17	1530003010	S.TRANSISTOR	2SC4117-GR (TE85R)	
Q18	1590000620	S.TRANSISTOR	FMS1 T148	
Q19	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	
Q20	1590000430	S.TRANSISTOR	DTC144EU T107	
D1	1720000370	S.VARICAP	HVU350TRF	
D2	1720000370	S.VARICAP	HVU350TRF	
D3	1720000370	S.VARICAP	HVU350TRF	
D4	1720000370	S.VARICAP	HVU350TRF	
D5	1790000450	S.DIODE	MA862(TX)	
D8	1790000620	S.DIODE	MA77(TW)	
D9	1790000620	S.DIODE	MA77(TW)	
D10	1790000620	S.DIODE	MA77(TW)	
D11	1720000360	S.DIODE	HSU88TRF	
D12	1720000360	S.DIODE	HSU88TRF	
D14	1720000360	S.DIODE	HSU88TRF	
D15	1790001280	S.DIODE	MA111(TX)	
D16	1720000180	S.VARICAP	1SV164-T2B	
D17	1720000360	S.DIODE	HSU88TRF	
D18	1790001210	S.DIODE	1SS375-TR	
FI1	2020001040	CERAMIC	CFWS455E	[Wide]
	2020001040	CERAMIC	CFWS455E	[Middle]
	2020001030	CERAMIC	CFWS455G	[Narrow]
FI2	2010001710	XTAL	FL-210 (21.800MHz)	[Wide]
	2010001710	XTAL	FL-210 (21.800MHz)	[Middle]
	2010001790	XTAL	FL-224 (21.800MHz)	[Narrow]
X1	6070000130	DISCRIMINATOR	CDBM455C24	
X2	6050009060	XTAL	CR-488 (21.345MH)	
X3	6050009310	XTAL	CR-507 (12.7982MHz)	
L1	6150003210	COIL	LS-319	
L2	6150003120	COIL	LS-321	
L3	6150003120	COIL	LS-321	
L4	6150003250	COIL	LS-335	
L5	6150003170	COIL	LS-334	
L6	6200002820	S.COIL	LQN 1A 47NJ04	
L7	6200002820	S.COIL	LQN 1A 47NJ04	

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION		
L8	6110002040	COIL	LA-225	
L9	6110002000	COIL	LA-226	
L10	6200001060	S.COIL	MLF2012D 47NM-T	
L11	6200001500	S.COIL	MLF2012D R12K-T	
L12	6200003290	S.COIL	ELJNC R12K-F	[H-band]
	6200001630	S.COIL	ELJNC R10K-F	[L-band]
L13	6200002150	S.COIL	ELJNC 56NK-F	[H-band]
	6200001630	S.COIL	ELJNC R10K-F	[L-band]
L14	6110002040	COIL	LA-225	[H-band]
	6110001540	COIL	LA-234	[L-band]
L15	6200002420	S.COIL	NL 252018T-068J	[H-band]
	6200002850	S.COIL	NL 252018T-R82J	[L-band]
L16	6200001260	S.COIL	MLF2012A 1R8M-T	
L17	6110002040	COIL	LA-225	
L18	6200004460	S.COIL	MLF1608D 82NM-T	
R1	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	[Wide]
	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	[Middle]
	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)	[Narrow]
R2	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	
R3	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)	
R4	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)	
R5	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)	
R9	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)	
R11	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)	
R12	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	
R13	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)	
R14	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)	[Wide]
	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)	[Middle]
	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)	[Narrow]
R15	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)	
R16	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	
R17	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R18	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)	
R19	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R20	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R21	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R22	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)	
R23	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R24	7030003230	S.RESISTOR	ERJ3GEYJ 180 V (18 Ω)	
R26	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	
R27	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	
R28	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	
R30	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	
R31	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)	
R32	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)	
R33	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)	
R34	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R35	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)	
R36	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R37	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	[H-band]
	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)	[L-band]
R42	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)	
R43	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	
R44	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	
R45	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	
R46	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	
R47	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)	
R48	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)	
R49	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	
R50	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	
R51	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	
R52	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	
R53	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)	
R54	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)	
R55	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R56	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	[H-band]
	7030003330	S.RESISTOR	ERJ3GEYJ 121 V (120 Ω)	[L-band]
R58	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)	
R59	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	

S.=Surface mount

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
R60	7030003570	S.RESISTOR ERJ3GEYJ 123 V (12 kΩ)
R61	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R63	7030000260	S.RESISTOR MCR10EZHJ 100 Ω (101)
R67	7030003590	S.RESISTOR ERJ3GEYJ 183 V (18 kΩ)
R68	7030003540	S.RESISTOR ERJ3GEYJ 682 V (6.8 kΩ)
R69	7030003230	S.RESISTOR ERJ3GEYJ 180 V (18 Ω)
R70	7030003370	S.RESISTOR ERJ3GEYJ 271 V (270 Ω)
R72	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ) [L-band]
	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ) [H-band]
R74	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ) [H-band]
	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ) [L-band]
R75	7030003540	S.RESISTOR ERJ3GEYJ 682 V (6.8 kΩ)
R76	7030003480	S.RESISTOR ERJ3GEYJ 222 V (2.2 kΩ)
R77	7510000430	S.THERMISTOR TN20-3K202LT
R78	7510000430	S.THERMISTOR TN20-3K202LT
R79	7030003620	S.RESISTOR ERJ3GEYJ 333 V (33 kΩ)
R80	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R81	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)
R82	7030003460	S.RESISTOR ERJ3GEYJ 152 V (1.5 kΩ)
R83	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R84	7030003460	S.RESISTOR ERJ3GEYJ 152 V (1.5 kΩ)
R85	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ) [H-band]
	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)[L-band]
R86	7030003670	S.RESISTOR ERJ3GEYJ 823 V (82 kΩ)
R87	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R88	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R89	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R90	7030003770	S.RESISTOR ERJ3GEYJ 564 V (560 kΩ)
R91	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)[Wide]
	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)[Middle]
	7030003650	S.RESISTOR ERJ3GEYJ 563 V (56 kΩ) [Narrow]
R92	7030003520	S.RESISTOR ERJ3GEYJ 472 V(4.7 kΩ) [H-band]
	7030003490	S.RESISTOR ERJ3GEYJ 272 V (2.7 kΩ) [L-band]
R93	7030003210	S.RESISTOR ERJ3GEYJ 120 V (12 Ω) [H-band]
	7030003260	S.RESISTOR ERJ3GEYJ 330 V (33 Ω) [L-band]
R94	7030000430	S.RESISTOR MCR10EZHJ 2.7 kΩ (272)
R95	7030003550	S.RESISTOR ERJ3GEYJ 822 V (8.2 kΩ)[Wide]
	7030003550	S.RESISTOR ERJ3GEYJ 822 V (8.2 kΩ [Middle]
	7030003540	S.RESISTOR ERJ3GEYJ 682 V (6.8 kΩ) [Narrow]
R96	7030003620	S.RESISTOR ERJ3GEYJ 333 V (33 kΩ)
R97	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)
R98	7410000950	S.ARRAY EXB-V8V 102JV
R99	7030000340	S.RESISTOR MCR10EZHJ 470 Ω (471)
R100	7030004050	S.RESISTOR ERJ3GEYJ 1R0 V (1 Ω)
R101	7030003240	S.RESISTOR ERJ3GEYJ 220 V (22 Ω)
R102	7030003240	S.RESISTOR ERJ3GEYJ 220 V (22 Ω)
R103	7030003410	S.RESISTOR ERJ3GEYJ 561 V (560 Ω)
R104	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R105	7030003370	S.RESISTOR ERJ3GEYJ 271 V (270 Ω)
C1	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A [Wide]
	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A [Middle]
	4030007130	S.CERAMIC C1608 CH 1H 101J-T-A [Narrow]
C2	4550006250	S.TANTALUM TEMSVA 1A 106M-8L
C3	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C4	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C5	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C6	4030011280	S.CERAMIC C1608 CH 1H 271J-T-A [Wide]
	4030011280	S.CERAMIC C1608 CH 1H 271J-T-A [Middle]
	4030010040	S.CERAMIC C1608 JB 1H 561K-T-A [Narrow]
C7	4030011280	S.CERAMIC C1608 CH 1H 271J-T-A [Wide]
	4030011280	S.CERAMIC C1608 CH 1H 271J-T-A [Middle]
	4030010040	S.CERAMIC C1608 JB 1H 561K-T-A [Narrow]
C8	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C9	4030007120	S.CERAMIC C1608 CH 1H 820J-T-A
C10	4030007140	S.CERAMIC C1608 CH 1H 121J-T-A
C11	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
C12	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C13	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C14	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C16	4030006990	S.CERAMIC C1608 CH 1H 080D-T-A [Wide]
	4030006990	S.CERAMIC C1608 CH 1H 080D-T-A [Middle]
	4030007030	S.CERAMIC C1608 CH 1H 150J-T-A [Narrow]
C17	4030007100	S.CERAMIC C1608 CH 1H 560J-T-A
C18	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C19	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C20	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C22	4030008560	S.CERAMIC C1608 CH 1H 300J-T-A
C24	4030009500	S.CERAMIC C1608 CH 1H 0R5B-T-A [H-band]
	4030009560	S.CERAMIC C1608 CH 1H R75B-T-A [L-band]
C25	4030008560	S.CERAMIC C1608 CH 1H 300J-T-A
C26	4030006940	S.CERAMIC C1608 CH 1H 030C-T-A
C27	4030009500	S.CERAMIC C1608 CH 1H 0R5B-T-A [H-band]
	4030009560	S.CERAMIC C1608 CH 1H R75B-T-A [L-band]
C28	4030008560	S.CERAMIC C1608 CH 1H 300J-T-A
C29	4030006930	S.CERAMIC C1608 CH 1H 020C-T-A [L-band only]
C30	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C31	4030008560	S.CERAMIC C1608 CH 1H 300J-T-A [H-band]
	4030007060	S.CERAMIC C1608 CH 1H 270J-T-A [L-band]
C32	4030009510	S.CERAMIC C1608 CH 1H 010B-T-A [H-band]
	4030006940	S.CERAMIC C1608 CH 1H 030C-T-A [L-band]
C33	4030007050	S.CERAMIC C1608 CH 1H 220J-T-A
C34	4030007050	S.CERAMIC C1608 CH 1H 220J-T-A
C35	4030007010	S.CERAMIC C1608 CH 1H 100D-T-A
C36	4030007130	S.CERAMIC C1608 CH 1H 101J-T-A [H-band]
	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A [L-band]
C37	4030007080	S.CERAMIC C1608 CH 1H 390J-T-A
C38	4030006940	S.CERAMIC C1608 CH 1H 030C-T-A
C39	4030008750	S.CERAMIC C1608 CH 1H 360J-T-A
C40	4030006930	S.CERAMIC C1608 CH 1H 020C-T-A
C41	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A [H-band]
	4030009650	S.CERAMIC C1608 CH 1H 240J-T-A [L-band]
C44	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C45	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C46	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C50	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C52	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C53	4550006360	S.TANTALUM ECST1VY104R
C54	4550006320	S.TANTALUM ECST0JY475R
C55	4550006320	S.TANTALUM ECST0JY475R
C56	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C58	4030007030	S.CERAMIC C1608 CH 1H 150J-T-A
C59	4030007030	S.CERAMIC C1608 CH 1H 150J-T-A
C60	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C61	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C62	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C64	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C65	4550006200	S.TANTALUM ECST0JY106R
C66	4030006960	S.CERAMIC C1608 CH 1H 050C-T-A
C67	4030006970	S.CERAMIC C1608 CH 1H 060D-T-A
C68	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C69	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C70	4030007010	S.CERAMIC C1608 CH 1H 100D-T-A
C71	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C72	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C73	4550006540	S.TANTALUM ECST1CY475R
C74	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C75	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C76	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
C77	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C78	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C79	4510005600	S.ELECTROLITIC ECEV1CS100SR
C80	4510005600	S.ELECTROLITIC ECEV1CS100SR
C81	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C82	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A [H-band]
	4030007030	S.CERAMIC C1608 CH 1H 150J-T-A [L-band]

S.=Surface mount

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C83	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A [H-band]
	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A [L-band]
C84	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A [H-band]
	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A [L-band]
C85	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C87	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C88	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C89	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C90	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C92	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C93	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C95	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C96	4550006130	S.TANTALUM	ECST1VY224R
C97	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C98	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C101	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C102	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C103	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C104	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C105	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C107	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C108	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C109	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C110	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C112	4610001890	S.TRIMMER	CTZ3E-20C-W1
C113	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C114	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C115	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C117	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C118	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C119	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C120	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A
C121	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C122	4550006540	S.TANTALUM	ECST1CY475R
C125	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C126	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A
C127	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C128	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A [H-band]
	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A [L-band]
C129	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A
C130	4030009650	S.CERAMIC	C1608 CH 1H 240J-T-A
C131	4030008560	S.CERAMIC	C1608 CH 1H 300J-T-A
C132	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C133	4030008190	S.CERAMIC	C1608 UJ 1H 040C-T-A
C135	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C136	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C137	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C138	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C139	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C140	4550006150	S.TANTALUM	ECST1CY105R
C141	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C142	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C143	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C144	4030008560	S.CERAMIC	C1608 CH 1H 300J-T-A
C146	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A [L-band only]
C147	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A [L-band only]
C148	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A [Wide]
	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A [Middle]
	4030006880	S.CERAMIC	C1608 JB 1H 472K-T-A [Narrow]
C149	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A
C150	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C151	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C152	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C153	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C154	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C155	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C156	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C157	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C158	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C159	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C160	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C161	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C162	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C163	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C164	4550006150	S.TANTALUM	ECST1CY105R
C165	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C166	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C167	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C168	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C169	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C170	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C171	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C172	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
W1	7120000380	JUMPER	JPW 01 R-01
W2	7120000380	JUMPER	JPW 01 R-01
W3	7120000380	JUMPER	JPW 01 R-01
J1	6450000130	CONNECTOR	HSJ1102-01-540
J2	6450001060	CONNECTOR	HSJ1493-01-010
J3	6510016410	S.CONNECTOR	4-176756-2
J4	6510016410	S.CONNECTOR	4-176756-2
EP1	0910042563	PCB	B 4263C
EP2	6910000970	BEAD	DL 2OP 2.6-3-1.2H

[CONNECT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
FI1	2040000810	S.LC	NFM41P11C204
FI2	2040000810	S.LC	NFM41P11C204
C1	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C2	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
EP1	0910042582	PCB	B 4265B

[PTT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7030005520	S.RESISTOR	RR0816R-334-D (330 kΩ)
R2	7030005500	S.RESISTOR	RR0816R-124-D (120 kΩ)
S1	2260001680	S.SWITCH	SKQDPB
S2	2260001990	S.SWITCH	SOP-112HST
S3	2260001990	S.SWITCH	SOP-112HST
S4	2260001990	S.SWITCH	SOP-112HST
EP1	0910042642	PCB	B 4271B

S.=Surface mount

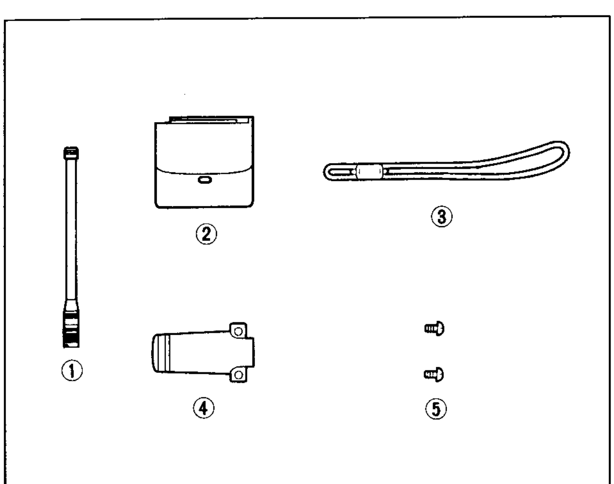
SECTION 8 MECHANICAL PARTS

• CHASSIS PARTS

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8210011500	1556 S-front panel (black)	1
	8210012410	1556 S-front panel (orange)	
②	8810006790	Screw PH No. 0 M2 × 3.5 ZK	4
③	8810006980	Screw FH No. 0 M2 × 3.5 NI	1
④	8930030030	1452 center seal	1
⑤	2510000770	Speaker SV-36W08020G	1
⑥	8930033620	1556 S-keyboard	1
⑦	8930033660	1556 LCD holder	1
⑧	5030000990	LCD LD-BU5703J	1
⑨	8930034750	LCD contact SRCN-1556 ZSS	1
⑩	8930031000	1332 LCD sheet	1
⑪	8310031320	1452 PTT plate	1
⑫	8810007190	Screw FH No. 0 M2 × 2.2 NI	1
⑬	8930031750	1452 PTT rubber sheet	1
⑭	8930033730	1452 PTT rubber (A)	1
⑮	8930031030	1452 mic sheet	1
⑯	8930033650	1556 mic seal	1
⑰	7700001600	Microphone KUC2123-030245	1
⑱	8810005900	Screw PH B0 No. 0-3 M1.4 × 3.5 NI	6
⑲	8900005430	Flexible cable OPC-535	1
⑳	8810006620	Screw PH No. 0 M2 × 3.5 NI	6
㉑	2260000980	Switch SKHHLP014A [S]	1
㉒	7210001440	Switch/Variable resistor RK097111101NA (10KA) [VOL]	1
㉓	8930033600	1556 main shield	1
㉔	8930030200	Standoff (BK)	4
㉕	8930033380	1556 M-holder	1
㉖	8930027000	Aluminum sheet T	1
㉗	6450001060	Connector HSJ1493-01-010 [SP]	1
㉘	6450000130	Connector HSJ1102-01-540 [MIC]	1
㉙	8930033640	1556 jack seal	1
㉚	8930029121	1257 release button (A)-1	1
㉛	6510017740	Antenna connector TNC-R131 (incl. nut)	1
㉜	8310034130	1556 switch plate	1
㉝	8930033630	1556 switch cover	1
㉞	8830000570	VR nut (A)	1
㉟	8610008750	Knob N200 (A) Black	1
㊱	8210012510	1556 rear panel (black)	1
	8210012520	1556 rear panel (orange)	
㊲	8930036580	1557 connector seal	1
㊳	8810008620	Screw PH BT M2 × 20 ZK	2
㊴	8930029821	1452 contact base-1	1
㊵	8310031302	1452 bottom plate-2	1
㊶	8930030041	1452 contact spring-1	2
㊷	8810006920	Screw PH No. 0 M2 × 5 NI	2

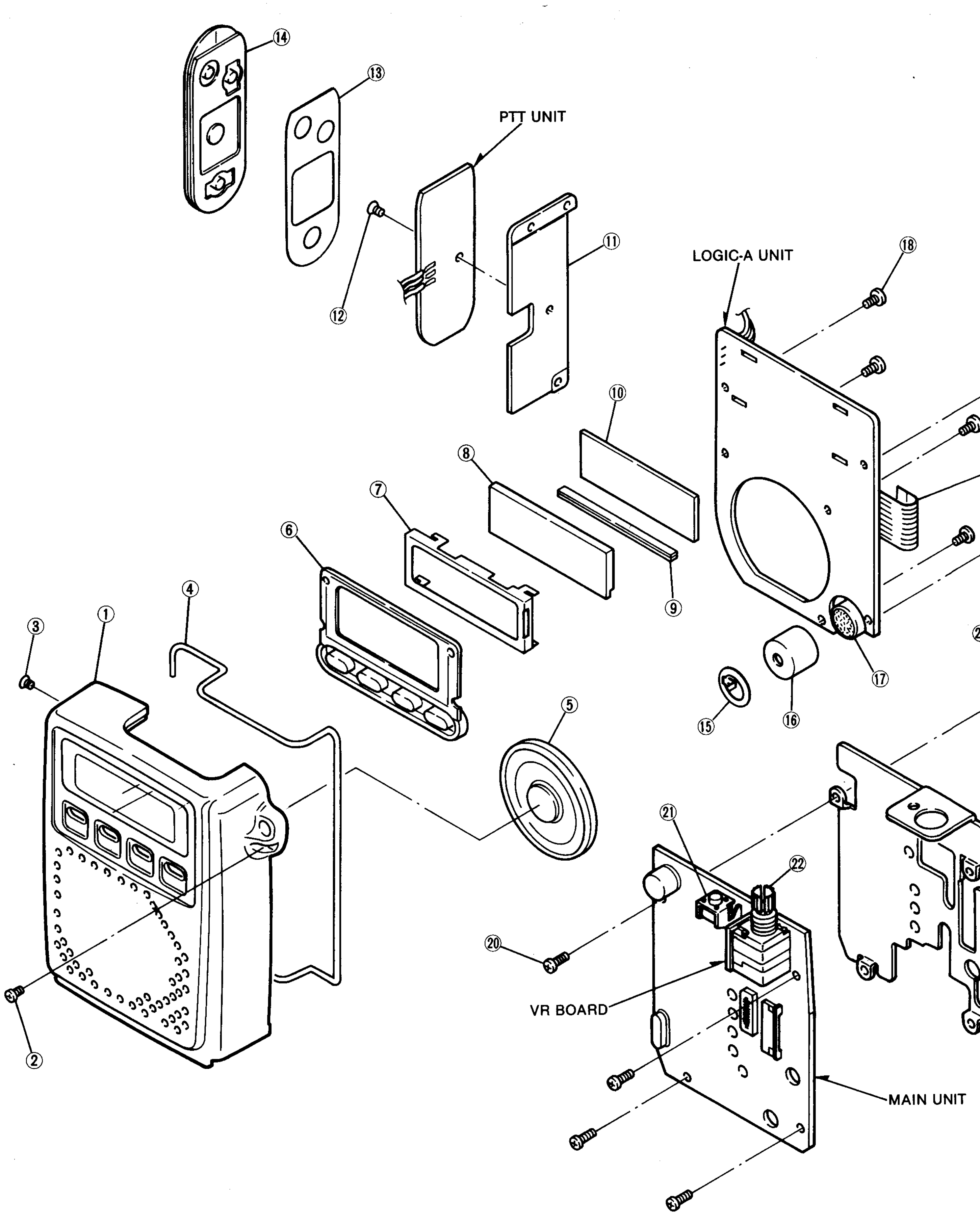
Screw abbreviations B0: Self-tapping PH: Pan head FH: Flat head NI: Nickel ZK: Black

• ACCESSORIES

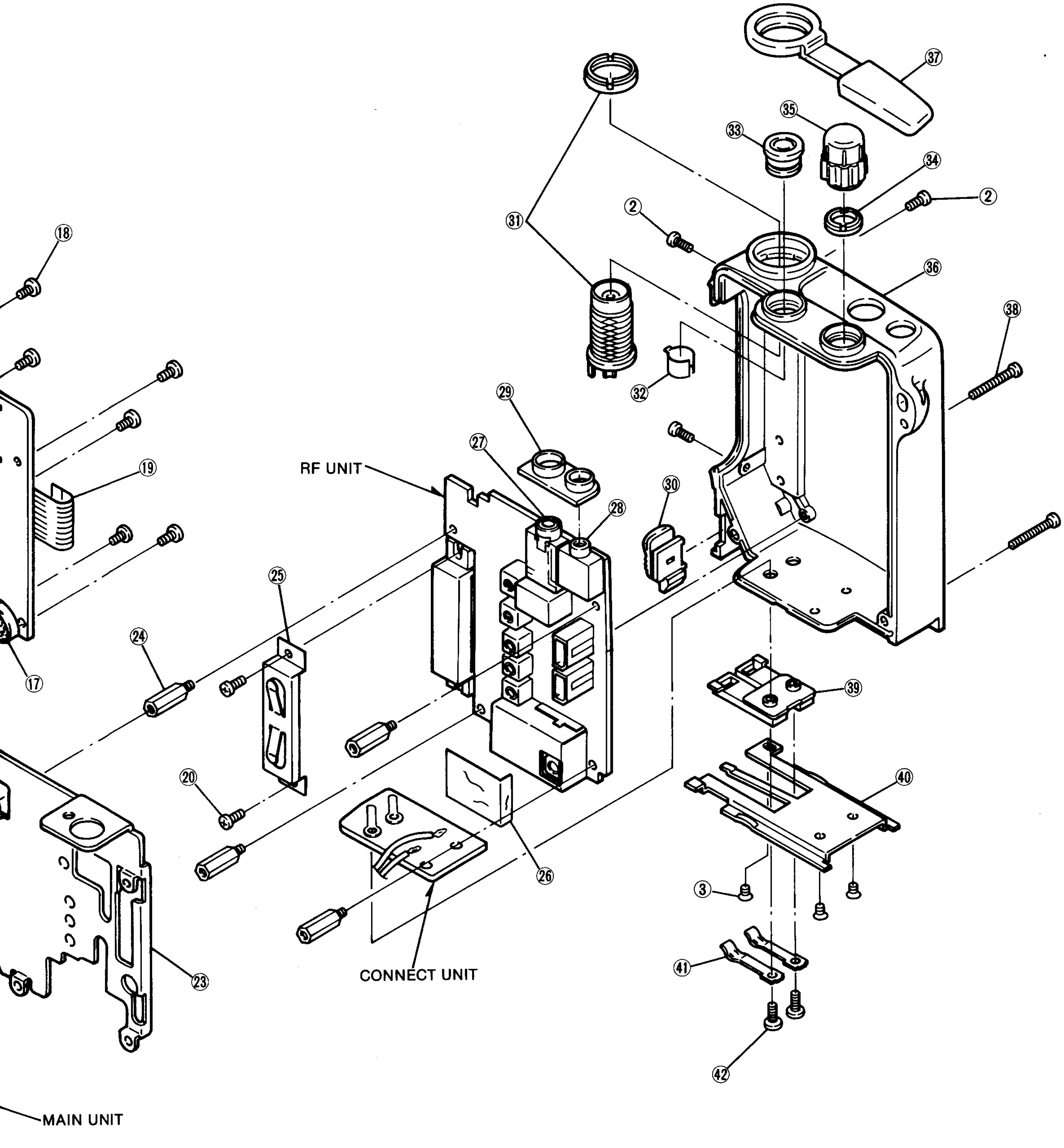


LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	3310000140	FA-135T flexible antenna (L-band)	1
	3310000150	FA-155T flexible antenna (H-band)	1
	3310000190	FA-160T flexible antenna (U.K. version)	1
②	Optional product	BP-160 BATTERY PACK	1
③	8010011960	Handstrap HK-005	1
④	8010008620	752 belt clip	1
⑤	8810005730	Screw BuH M3 × 3 ZK BS	2

Screw abbreviations BuH: Button head BS: Brass ZK: Black



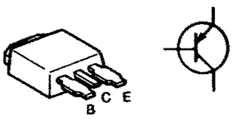
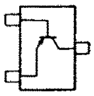
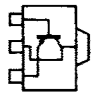
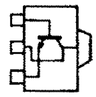
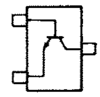
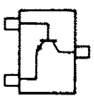
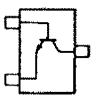
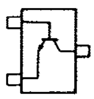
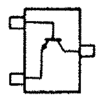
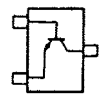
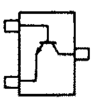
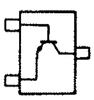
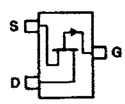
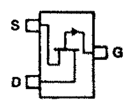
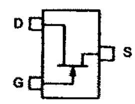
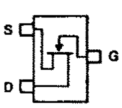
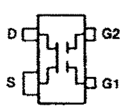
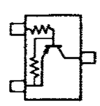
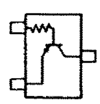
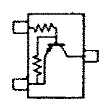
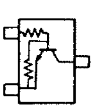
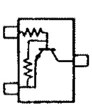
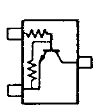
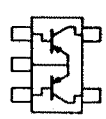
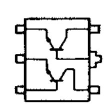
PTT UNIT
LOGIC-A UNIT
VR BOARD
MAIN UNIT



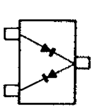
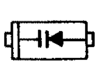
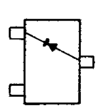
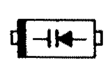
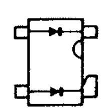
RF UNIT
CONNECT UNIT
MAIN UNIT
2
3
17
18
19
20
23
24
25
26
27
28
29
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31
32
33
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38
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41
42

SECTION 9 SEMICONDUCTOR INFORMATION

• TRANSISTORS

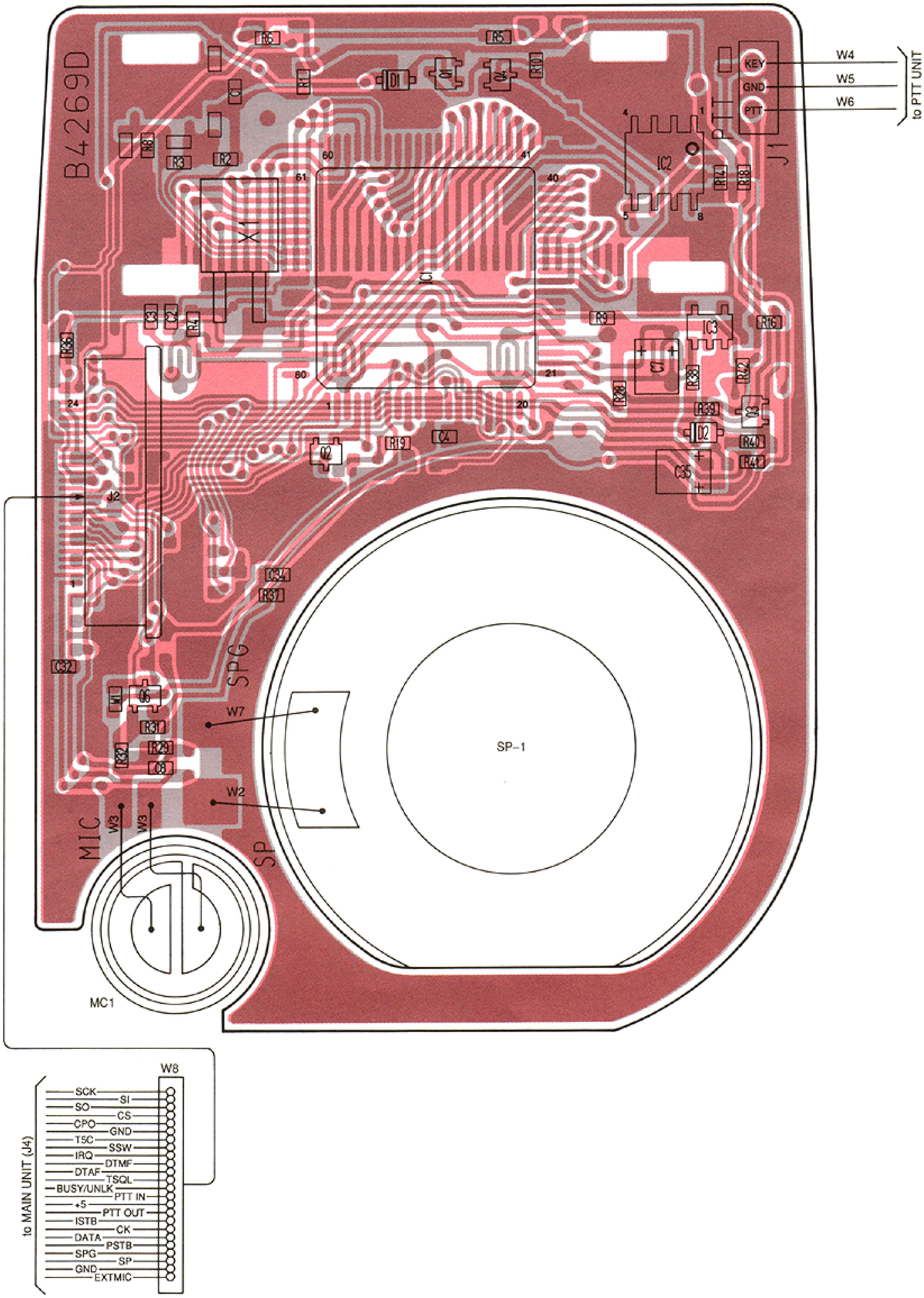
2SB1201 S TL (Symbol: 2M)  	**2SA1622 6 TR** (Symbol: M6) 	**2SB1132 Q** (Symbol: BA) 	**2SC2954** (Symbol: QK) 	**2SC4081 R** (Symbol: BR) 
2SC4116 BL (Symbol: LL) 	**2SC4117 GR** (Symbol: DG) 	**2SC4211 6 TR** (Symbol: L6) 	**2SC4215 O** (Symbol: QO) 	**2SC4226 R25** (Symbol: R25) 
2SC4403 3 (Symbol: LY3) 	**2SC4405 3** (Symbol: OY3) 	**2SJ144 GR** (Symbol: VG)  	**2SJ144 Y** (Symbol: VY)  	**2SK302 GR** (Symbol: TG) 
2SK880 Y (Symbol: XY)  	**3SK177 U73** (Symbol: U73)  	**DTA114EU** (Symbol: 14) 	**DTA114TU** (Symbol: 94) 	**DTA144EU** (Symbol: 16) 
DTC114EU (Symbol: 24) 	**DTC144EU** (Symbol: 26) 	**DTC144TU** (Symbol: 06) 	**FMS1** (Symbol: SI) 	**XP1501** (Symbol: 5R) 

• DIODES

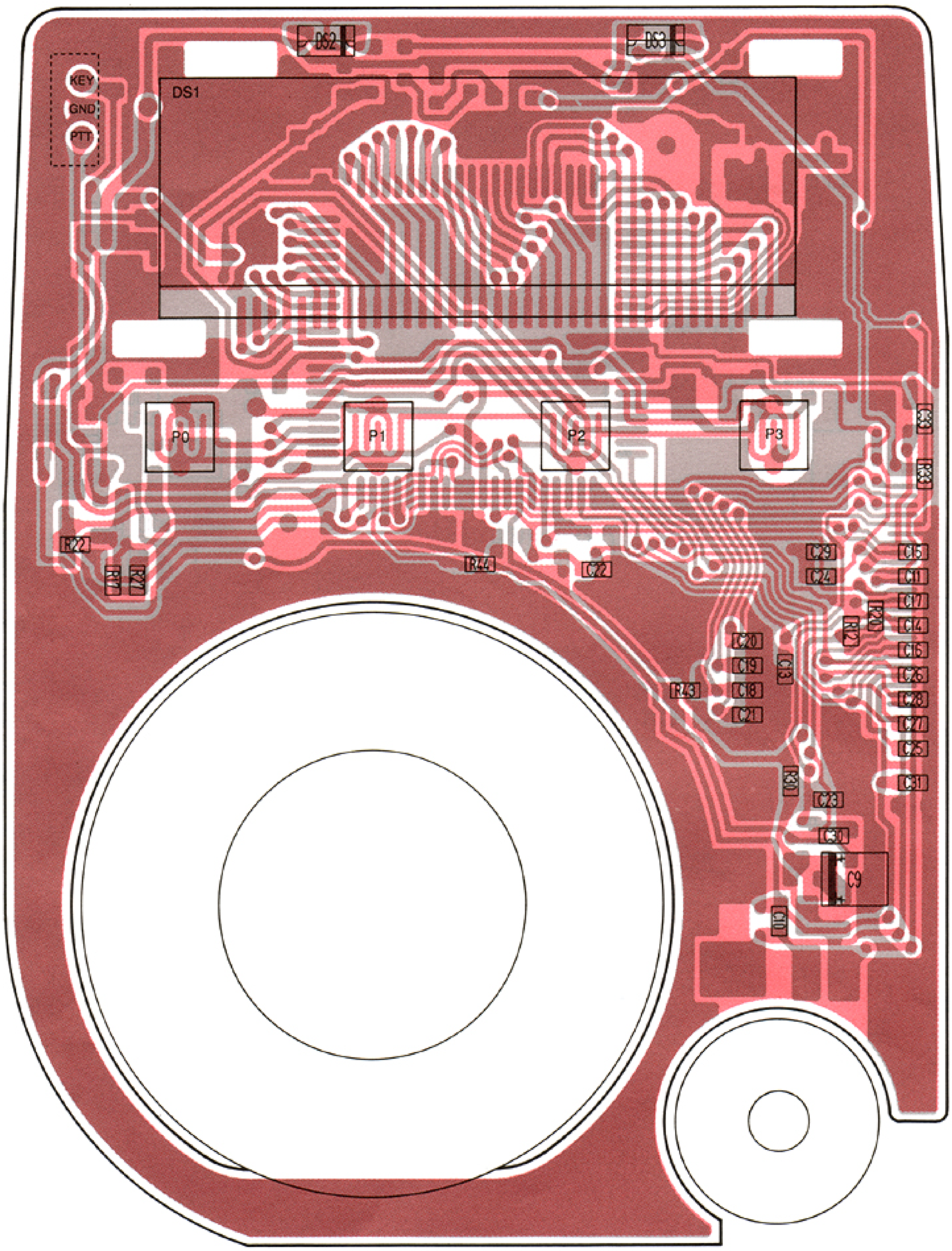
1SS375 (Symbol: FH) 	**1SV164** No symbol, orange line 	**HSU88TRF** (Symbol: 9) 	**HVU350TRF** (Symbol: 4) 	**MA862** (Symbol: M1I) 

10-1 LOGIC-A UNIT

• LOGIC-A UNIT

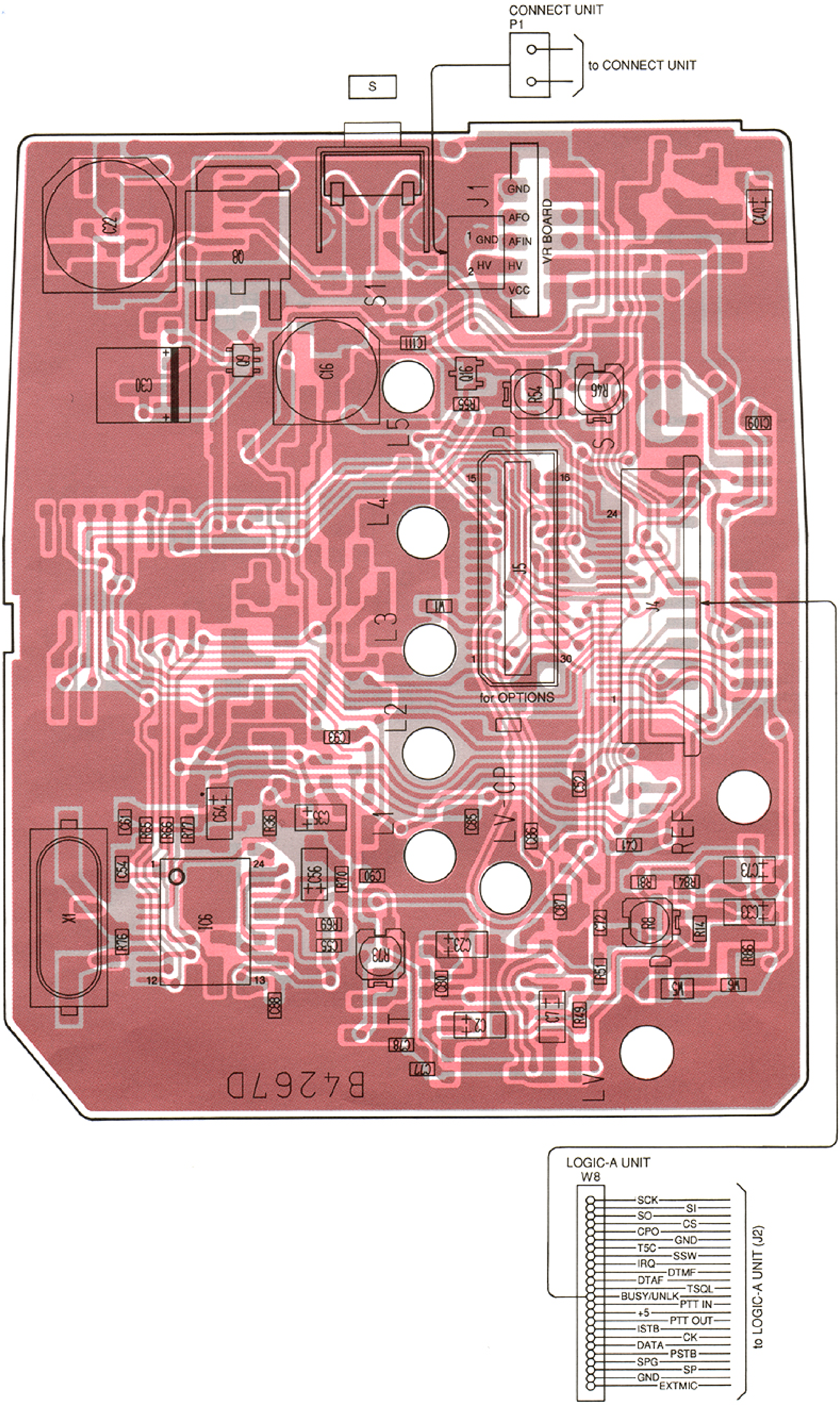


• **LOGIC-A UNIT**

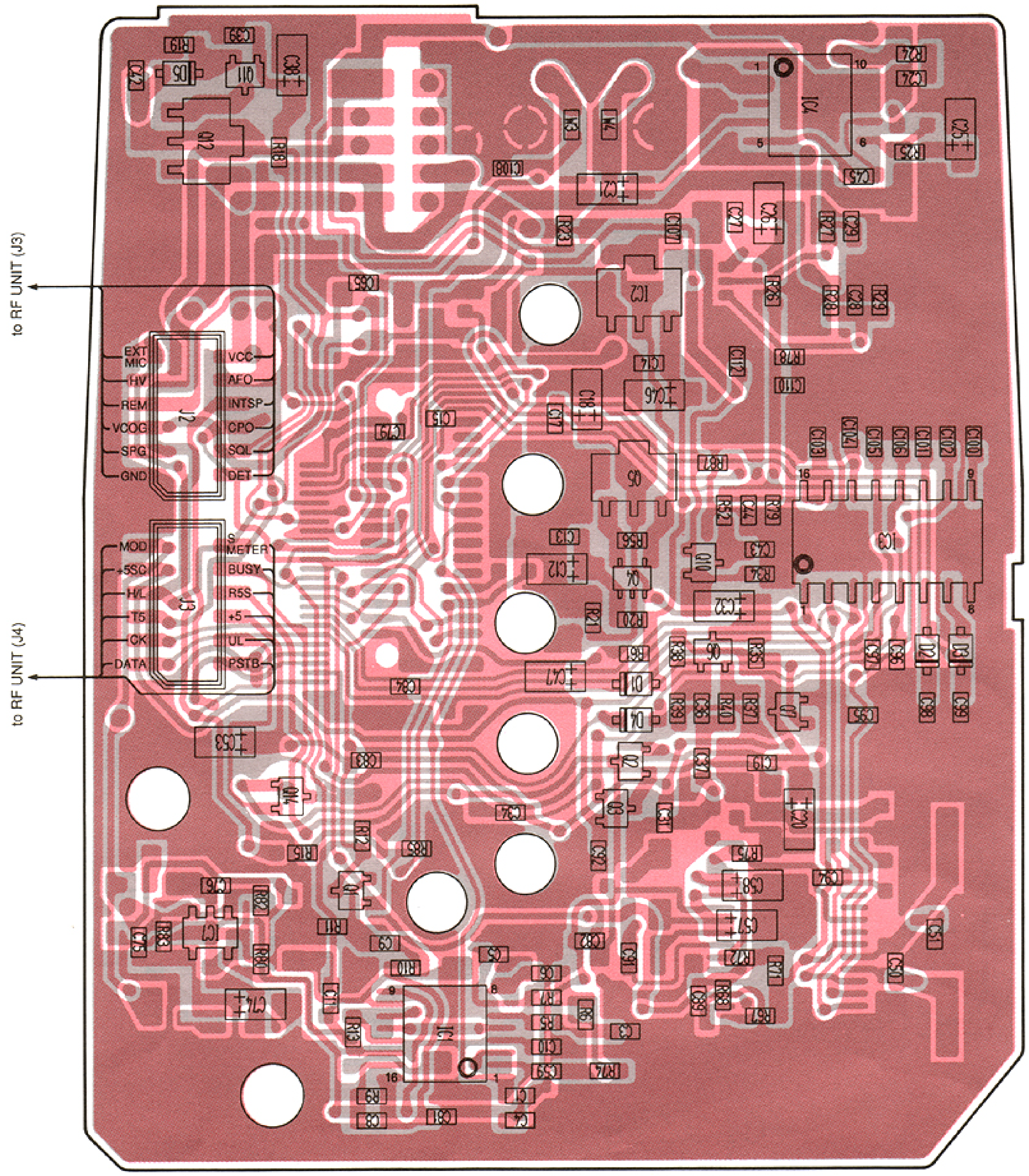

DS2
DS3
KEY
GND
PTT
DS1
P0
P1
P2
P3
R22
R44
C22
C29
C24
C15
C11
C17
C14
C16
C26
C28
C27
C25
C31
C20
C19
C18
C21
C13
R43
R30
C23
C30
C9
C10

10-2 MAIN UNIT

• MAIN UNIT

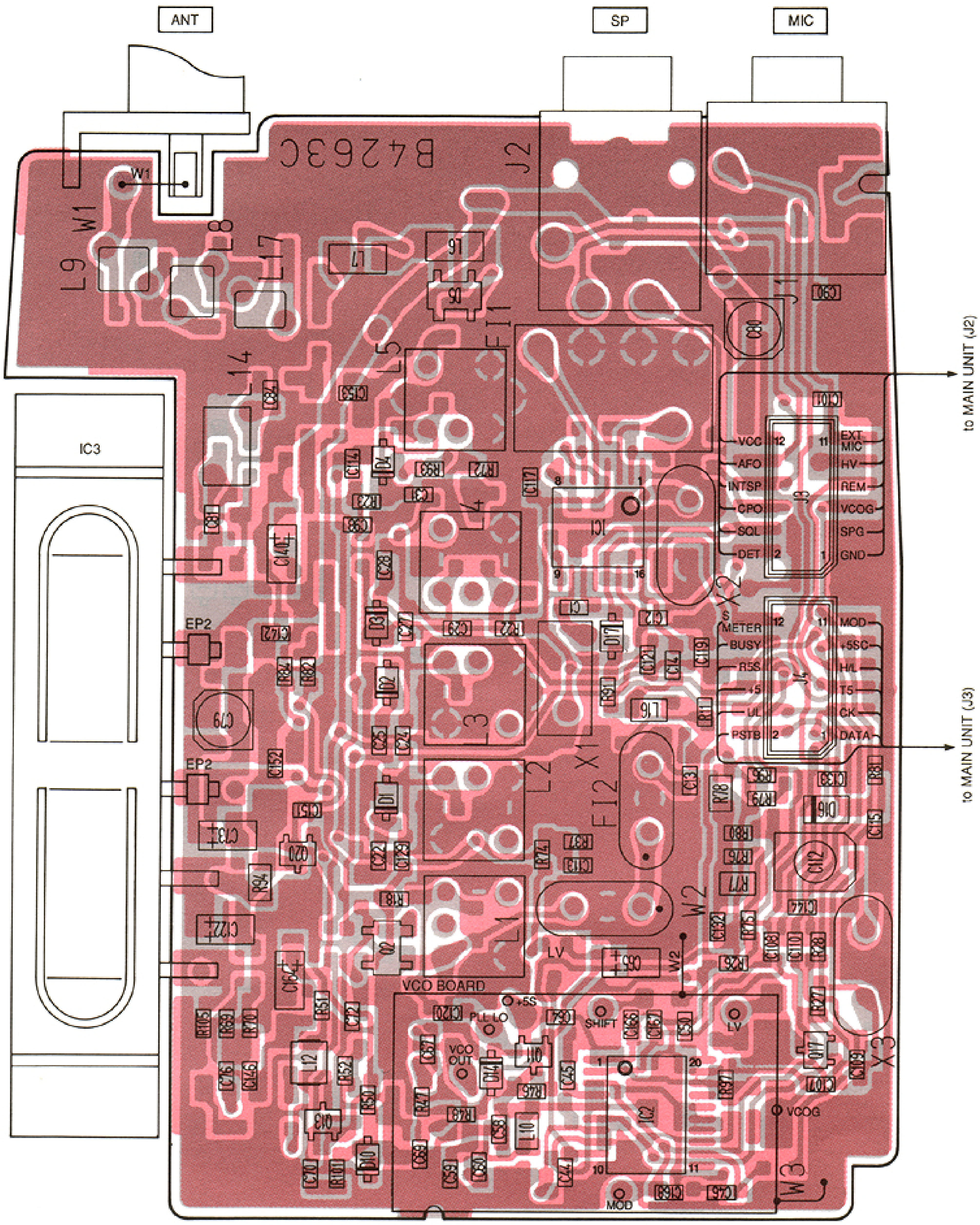


• **MAIN UNIT**

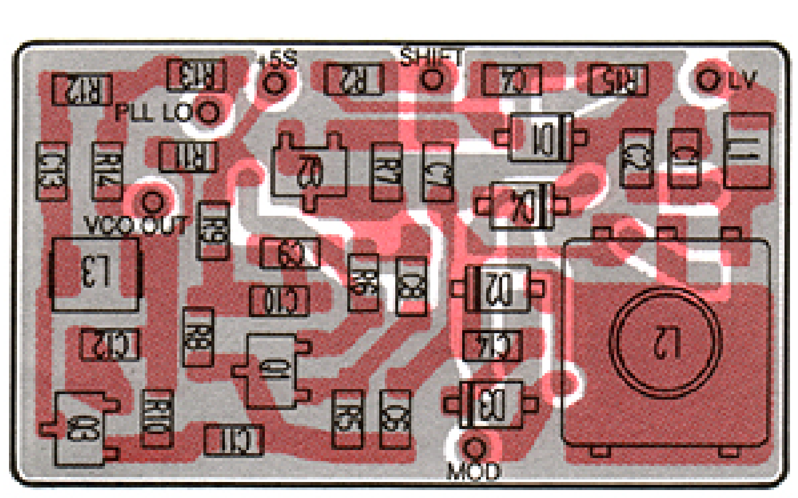

to RF UNIT (J3)
to RF UNIT (J4)
EXT MIC
HV
REM
VCOG
SPG
GND
VCC
AFO
INTSP
CPO
SQL
DET
J2
MOD
+5SC
H/L
T5
CK
DATA
S METER
BUSY
R5S
+5
UL
PSTB
J3
IC1
IC2
IC3
IC4
IC7

10-3 RF UNIT

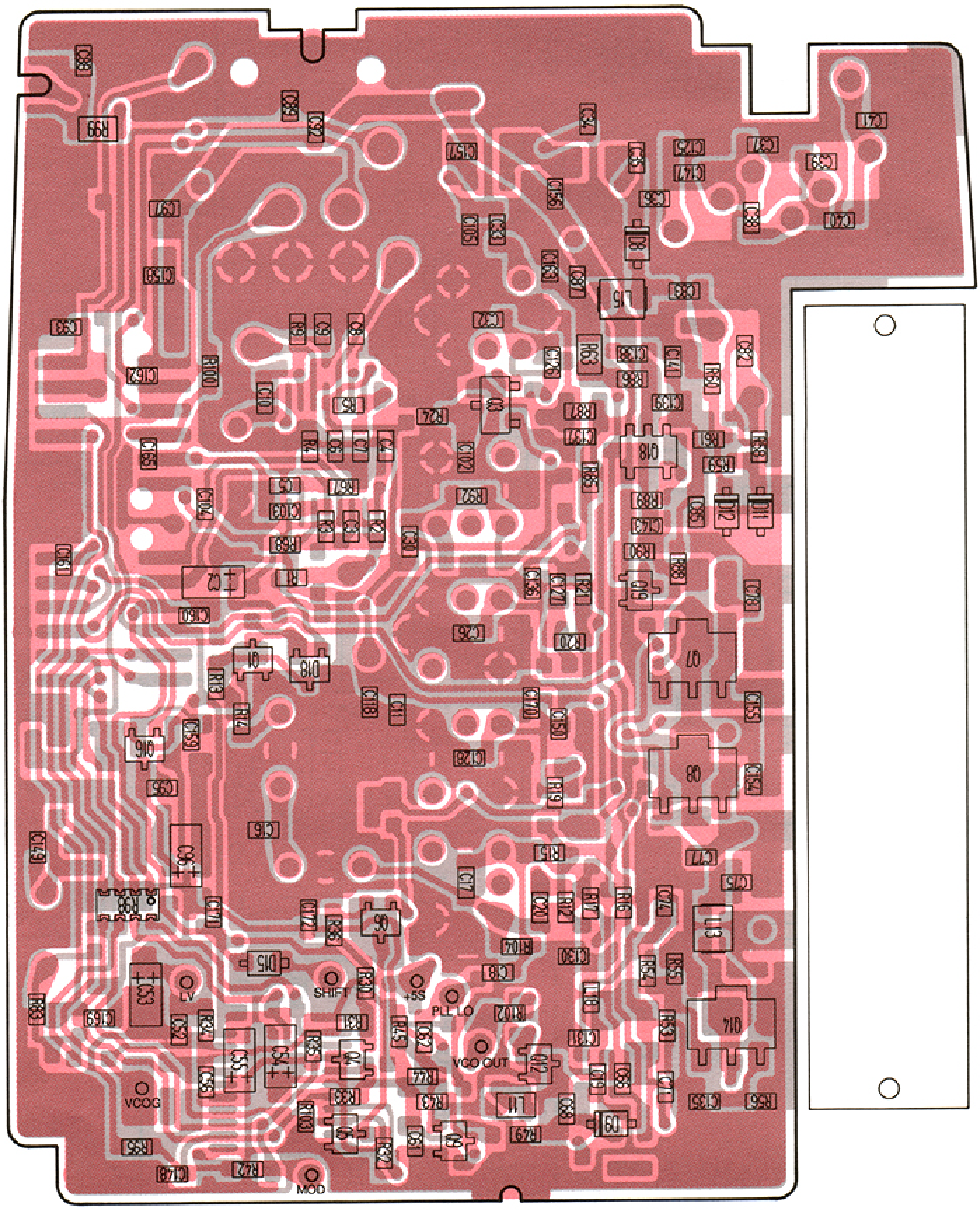
• RF UNIT



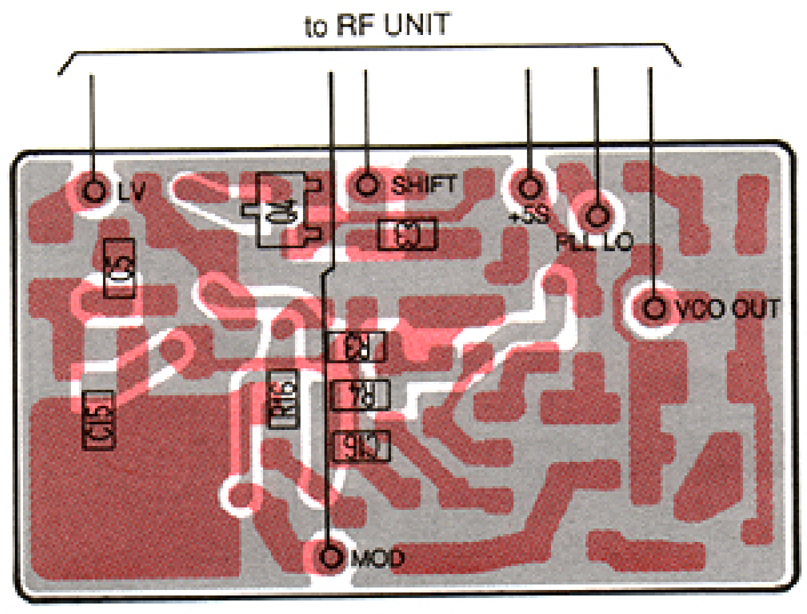
• VCO BOARD



• **RF UNIT**

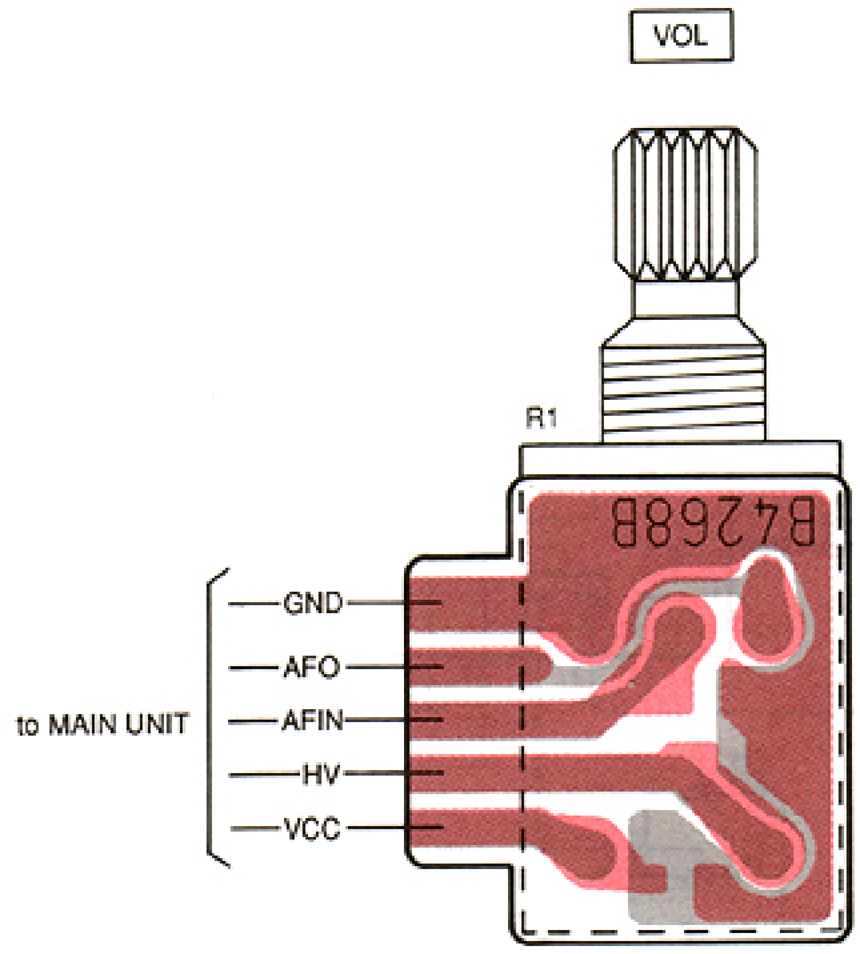


• **VCO BOARD**

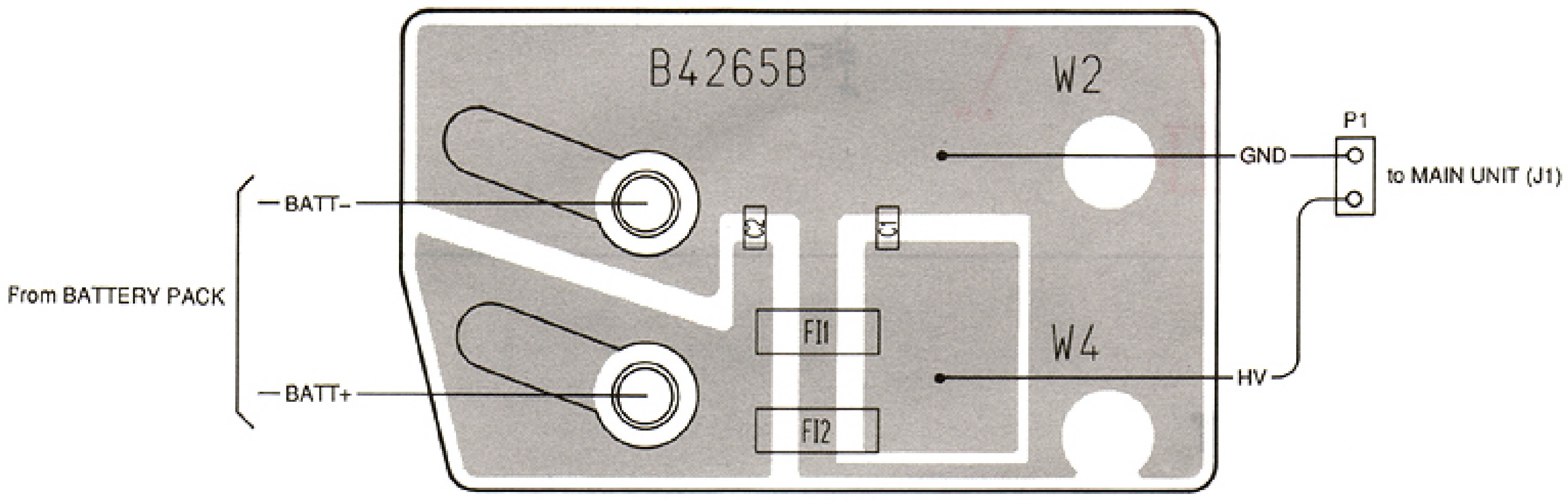


10-4 VR BOARD, CONNECT AND PTT UNITS

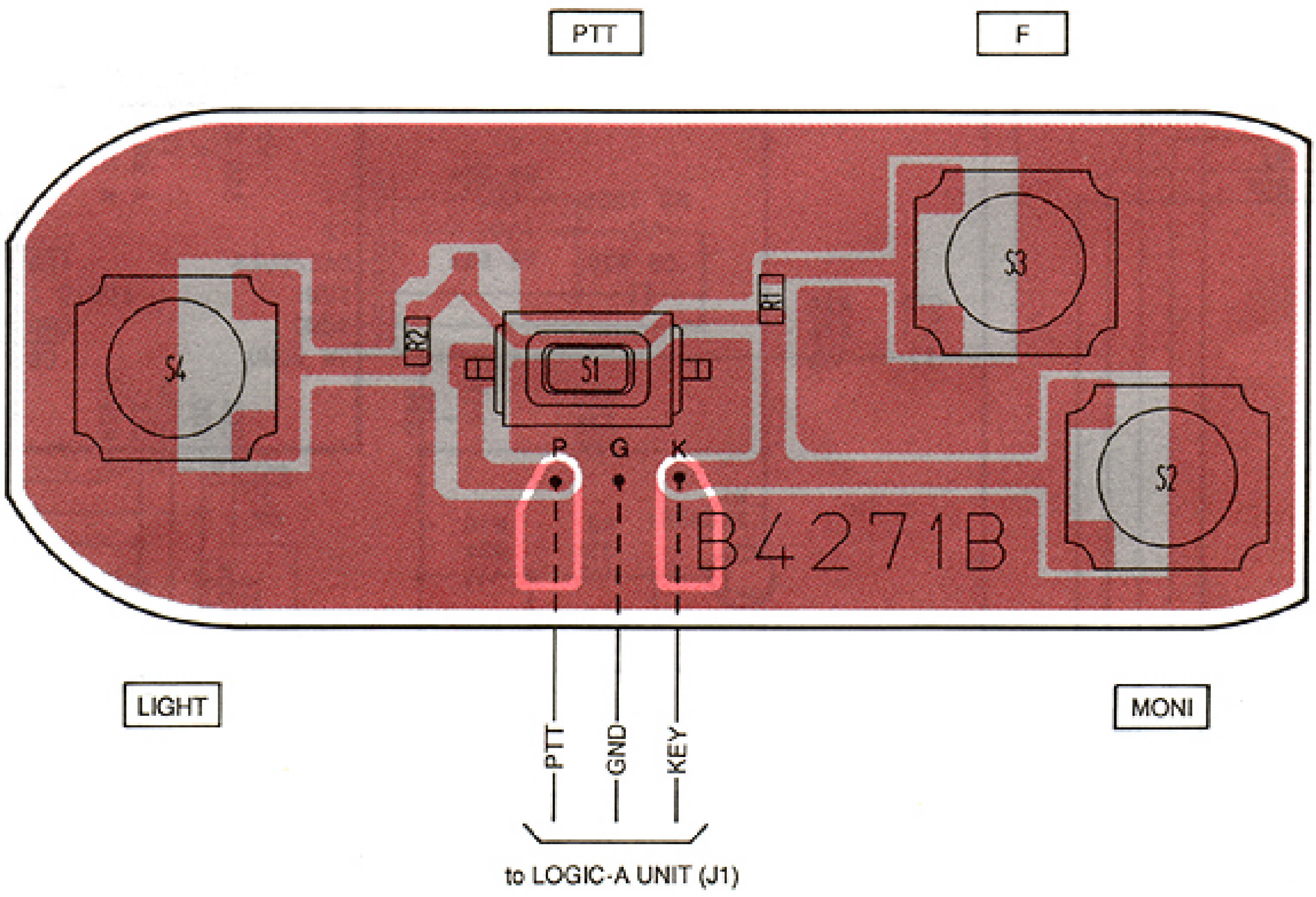
• VR BOARD



• CONNECT UNIT

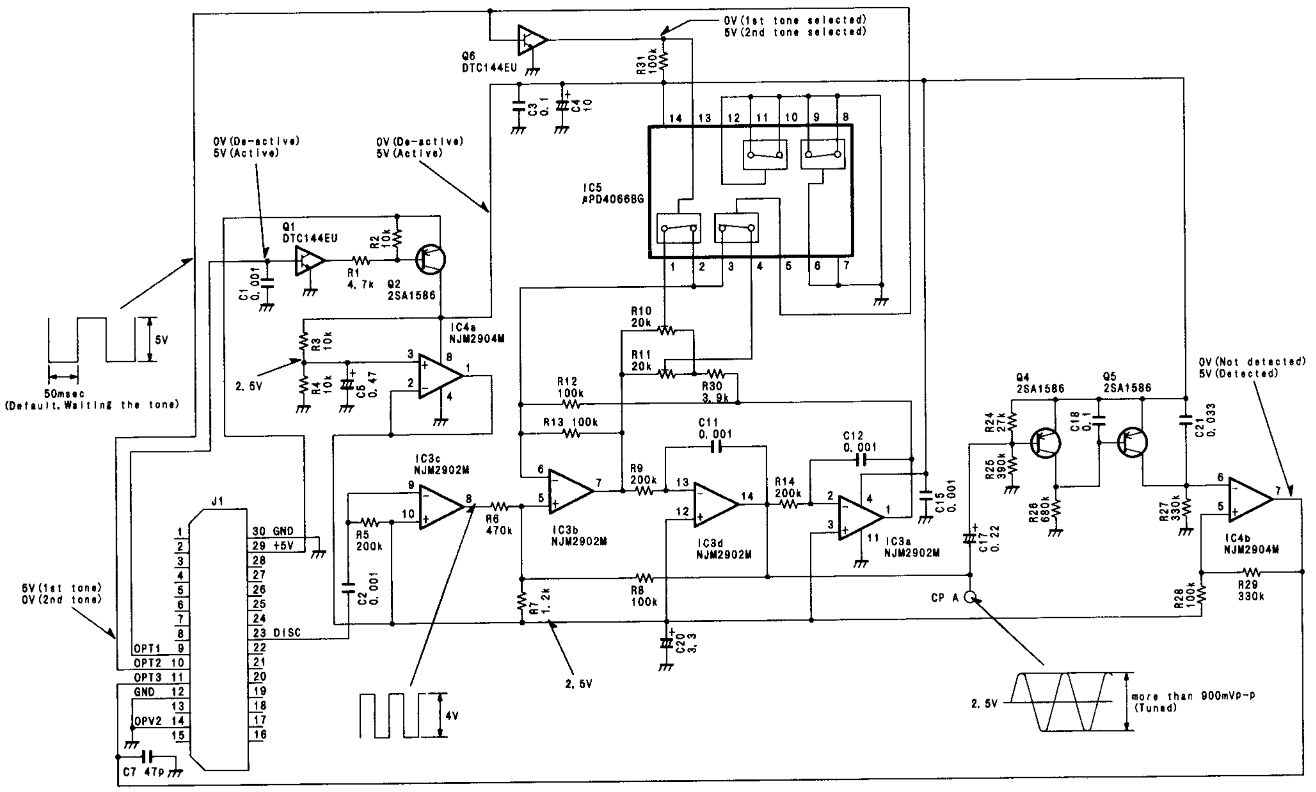


• PTT UNIT

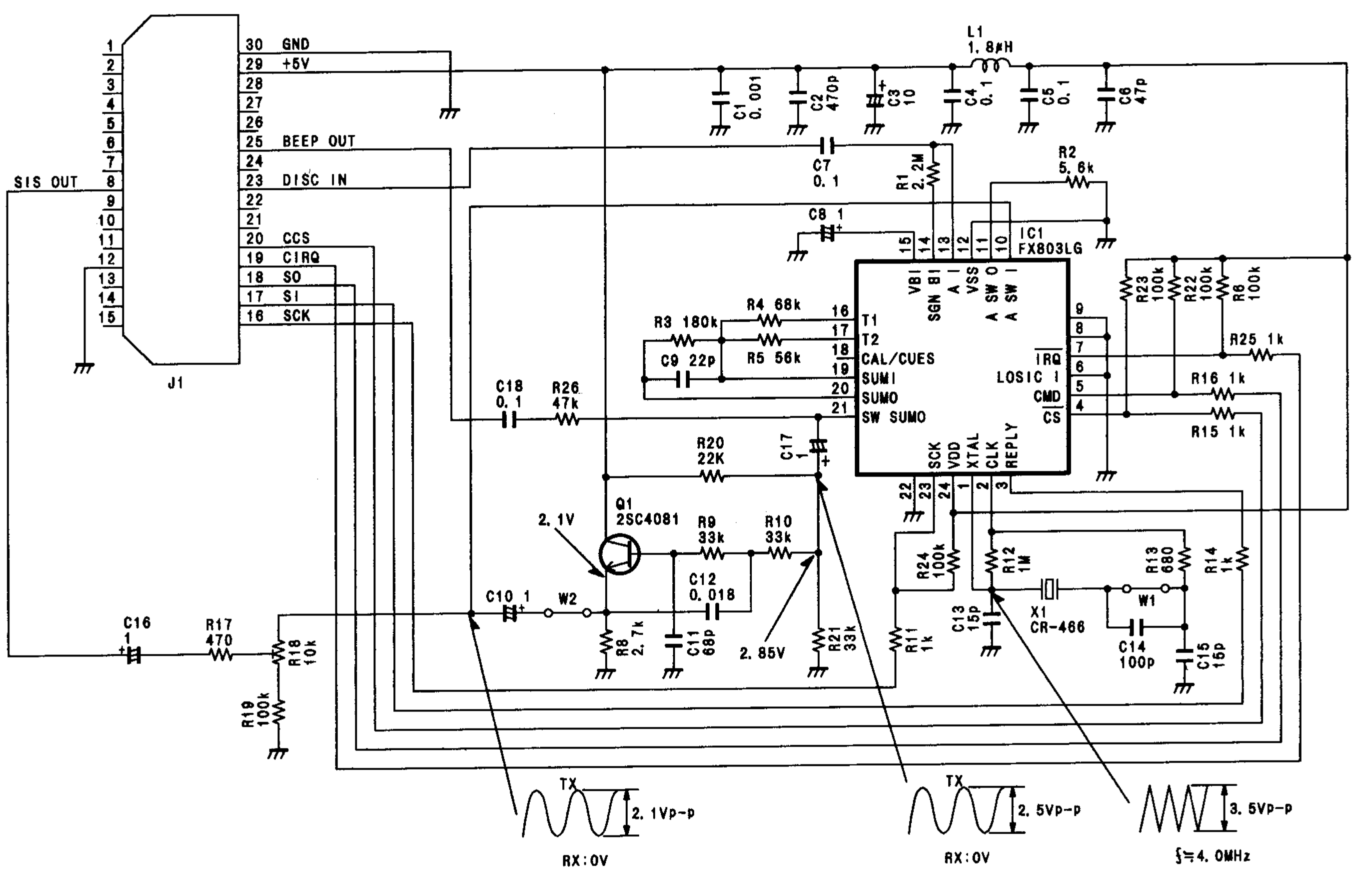


SECTION 11 OPTIONAL UNITS

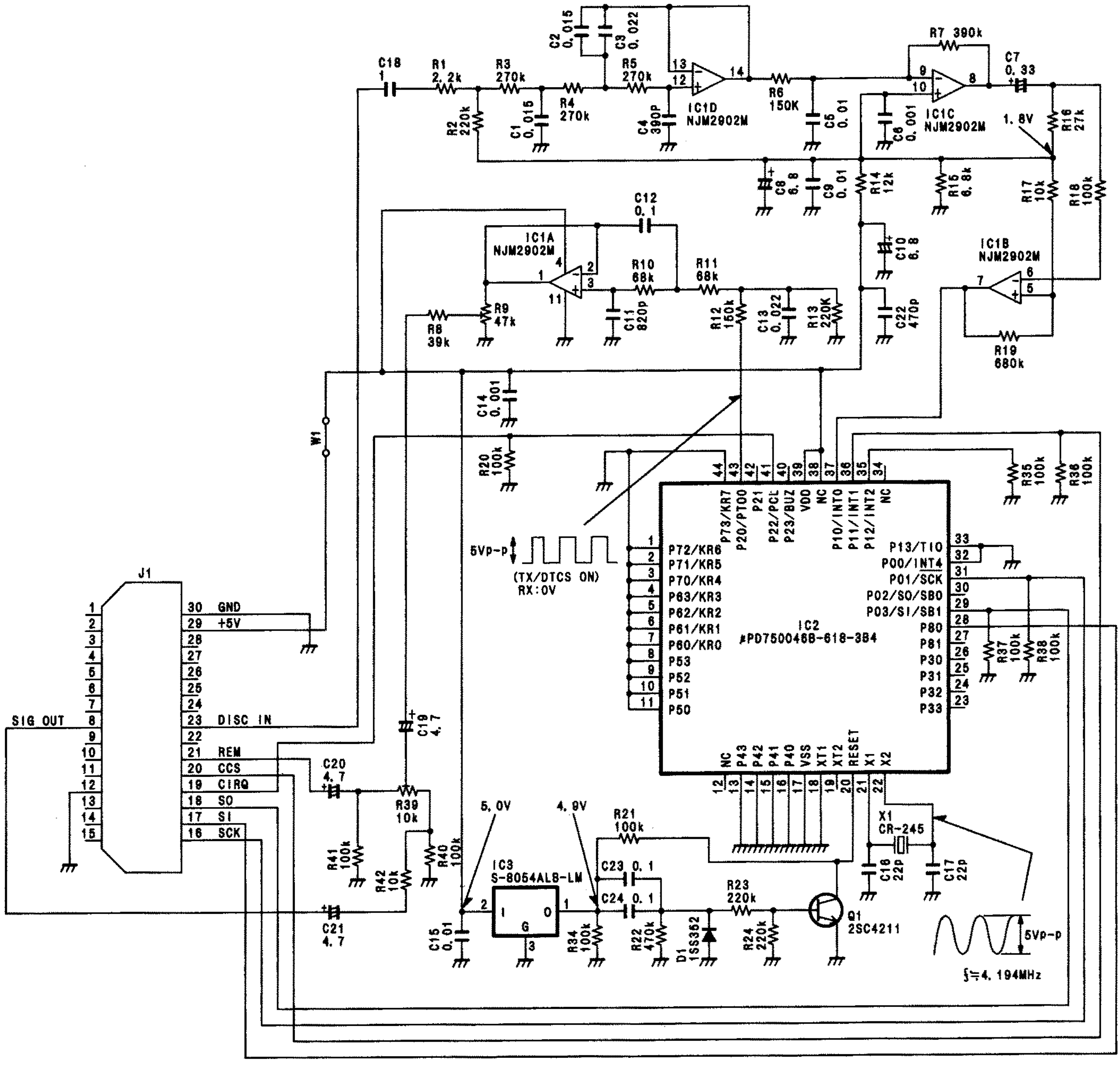
11-1 UT-80 2-TONE UNIT



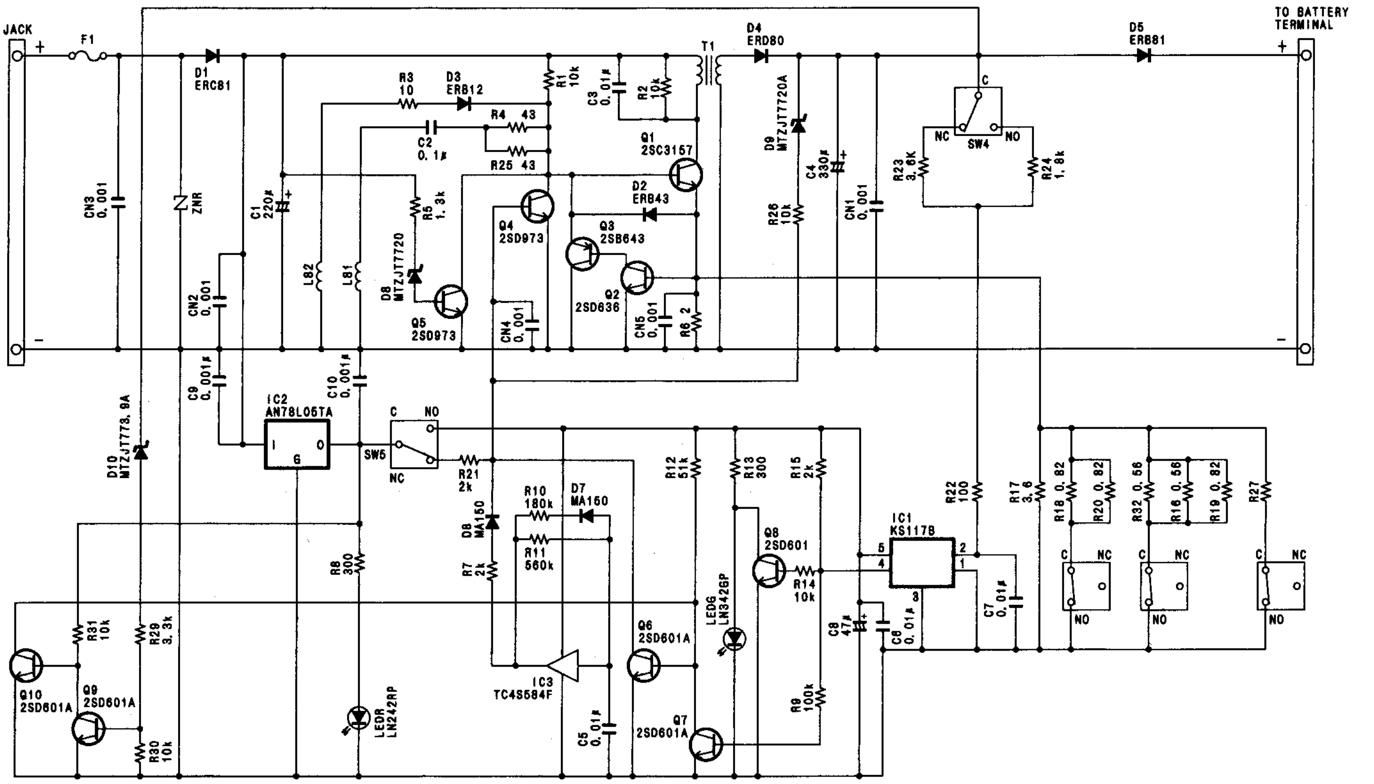
11-2 UT-96 5-TONE UNIT



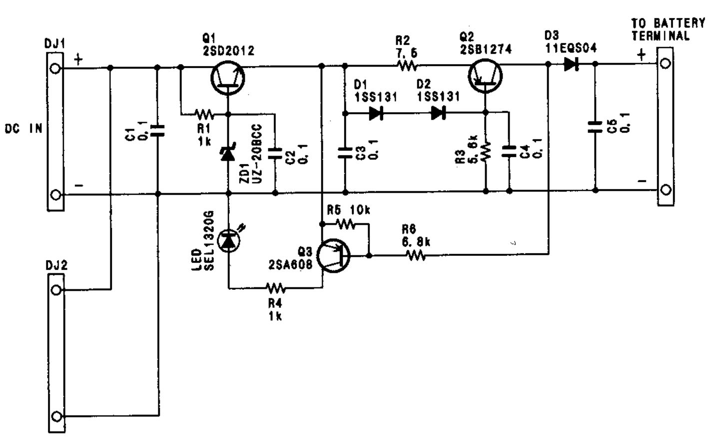
11-3 UT-97 DTCS UNIT



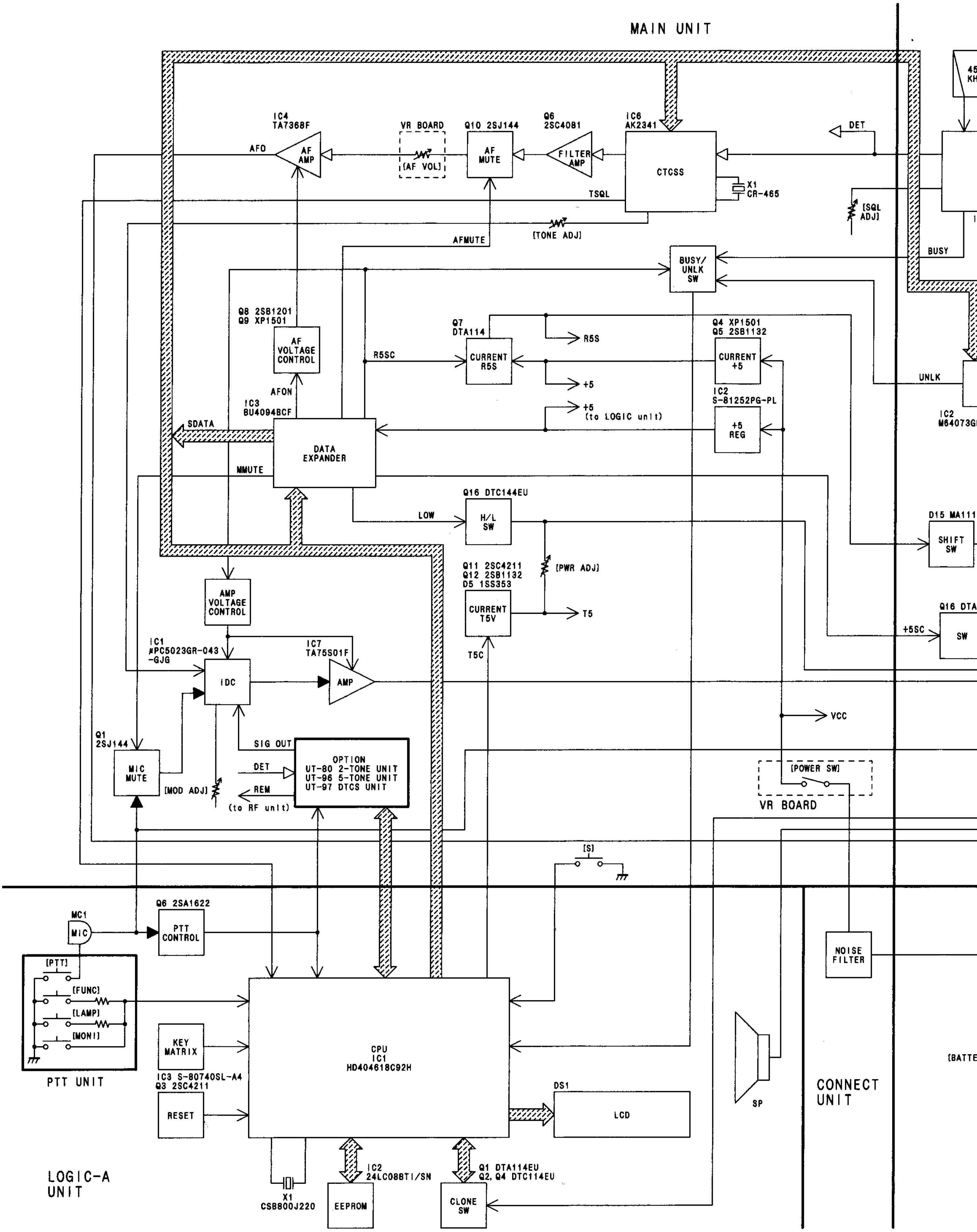
11-4 BC-79 DESKTOP CHARGER

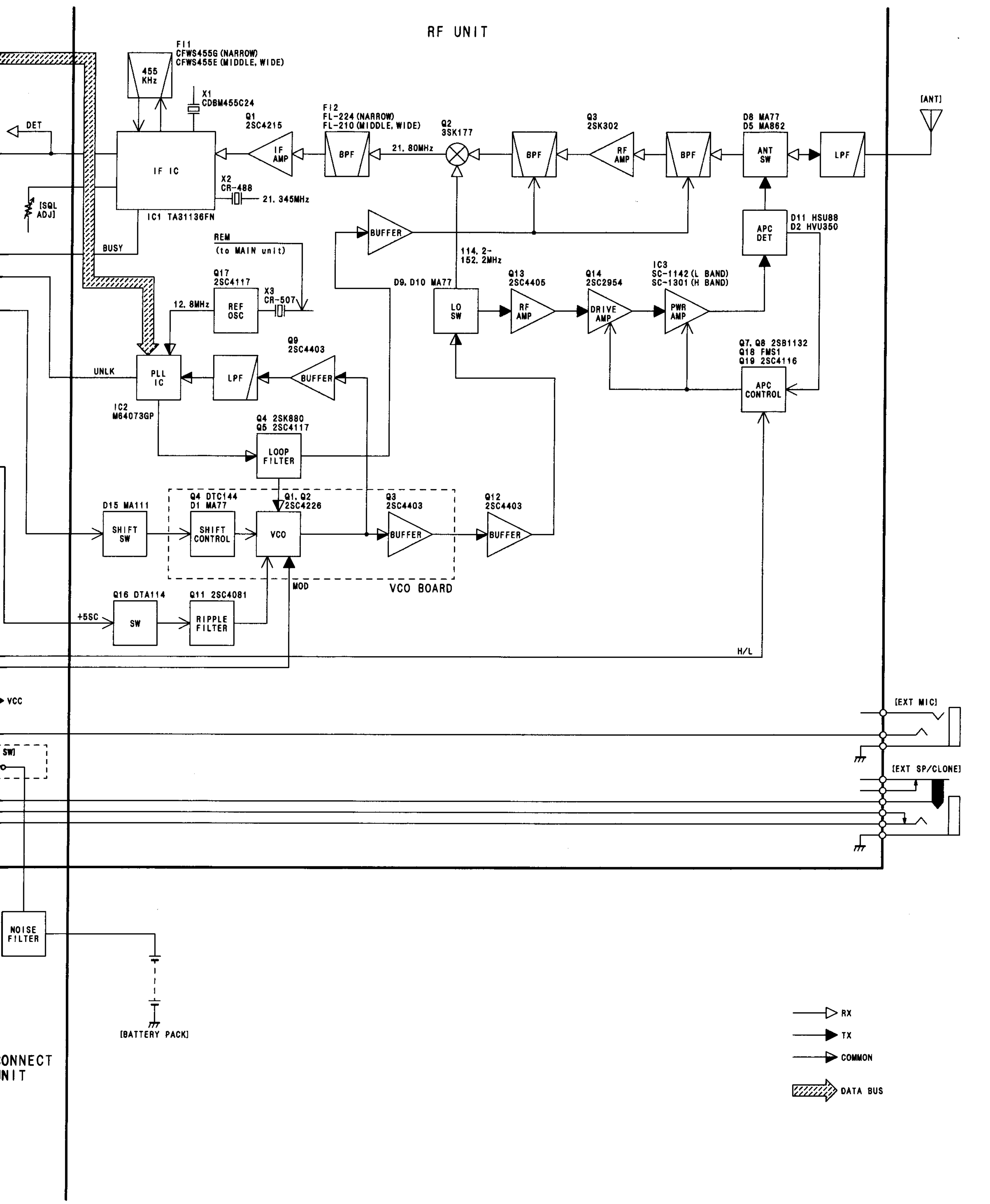


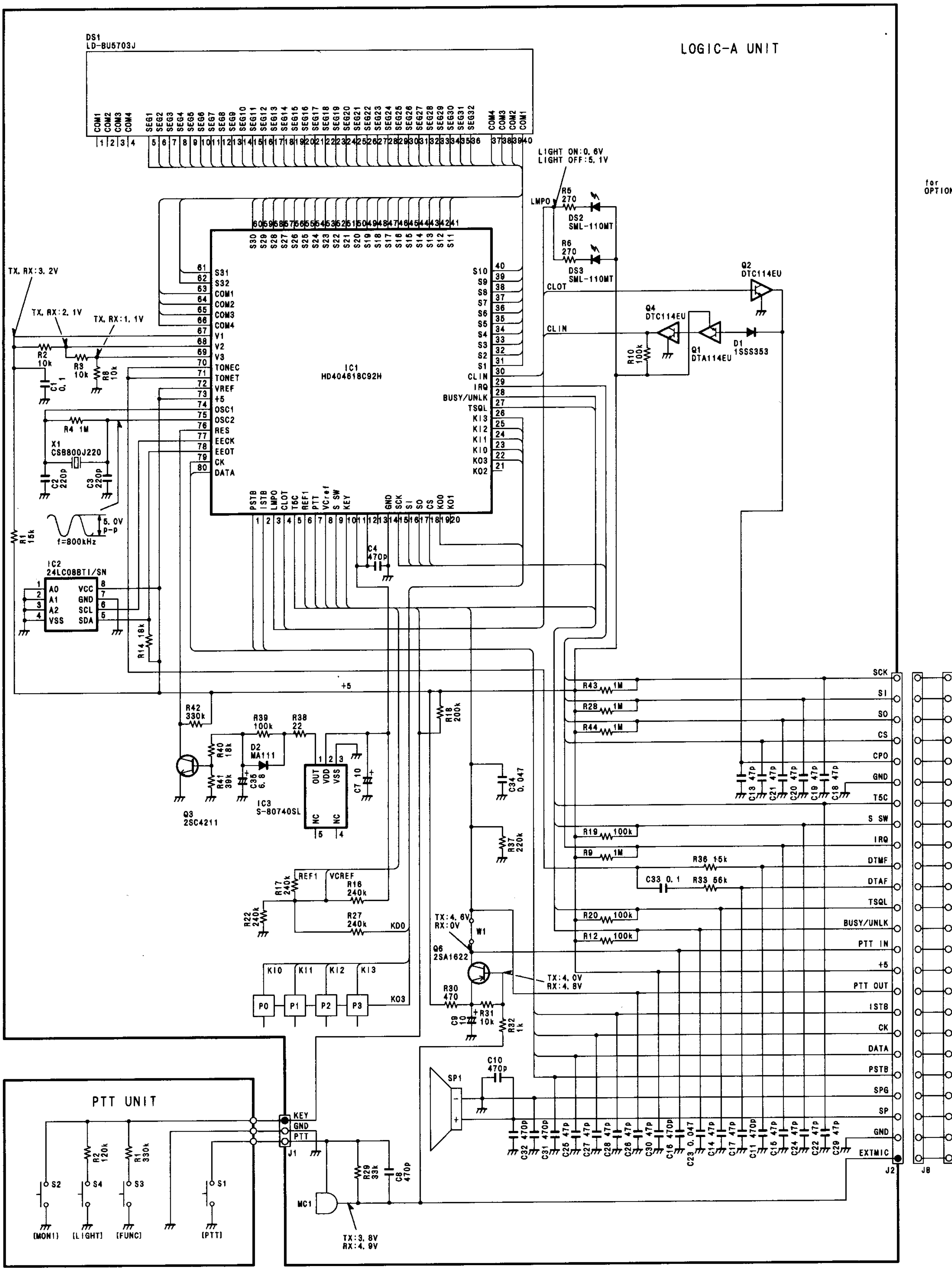
11-5 AD-54 BATTERY CHARGER

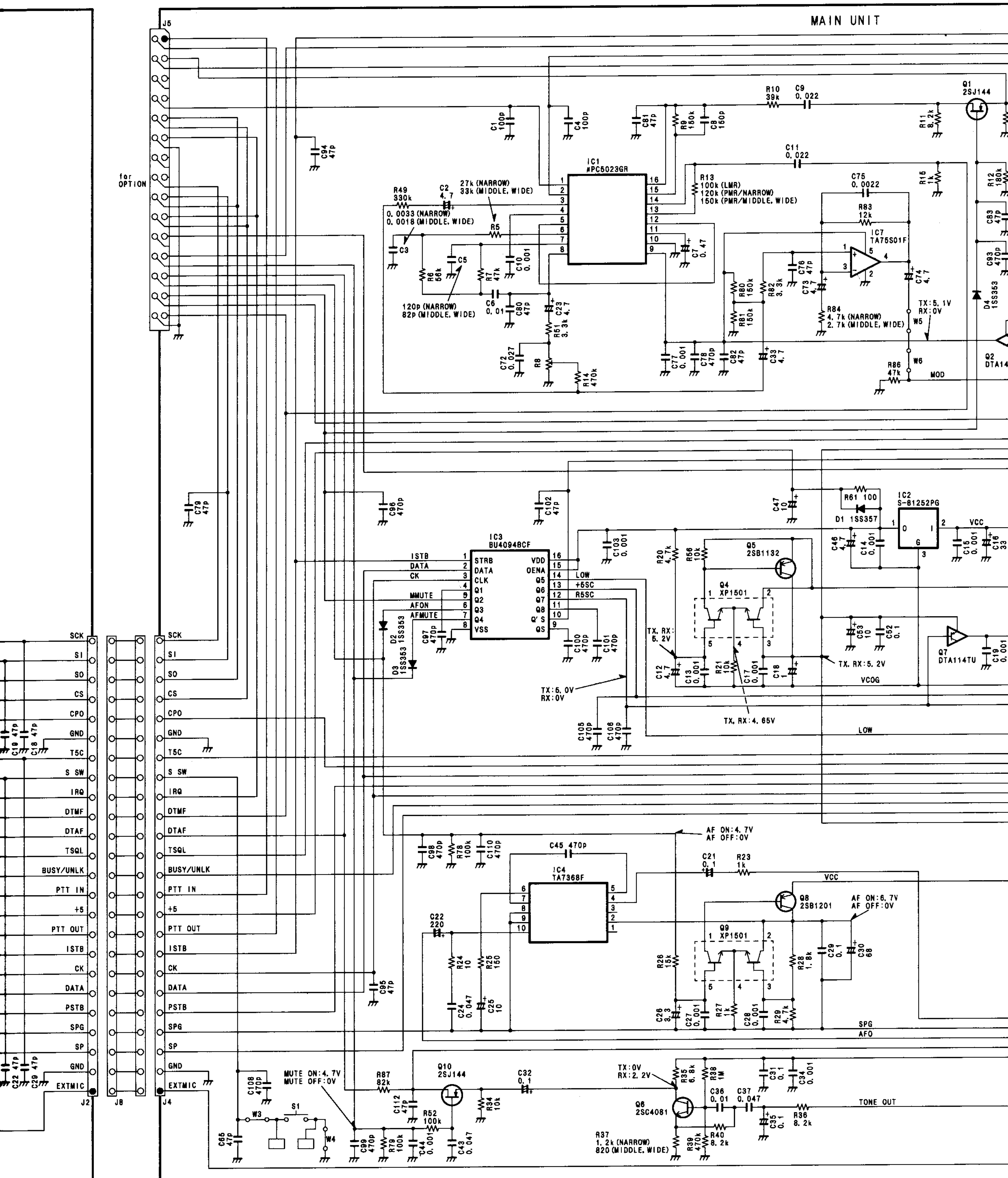


SECTION 12 BLOCK DIAGRAM

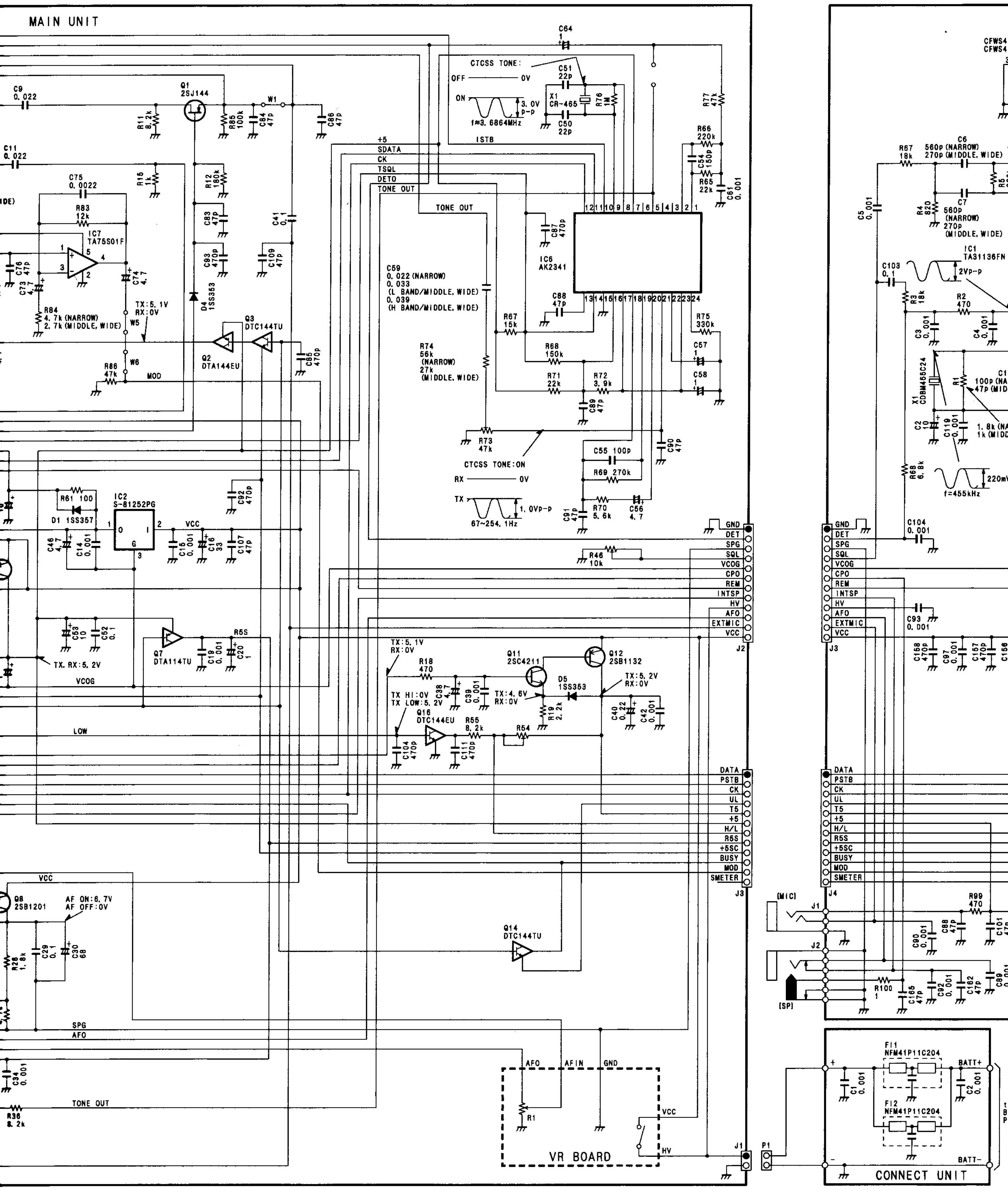



RF UNIT
FI1
CFWS455G (NARROW)
CFWS455E (MIDDLE, WIDE)
455 KHz
X1
CDBM455C24
DET
IF IC
IC1 TA31136FN
X2
CR-488
21.345MHz
[SQL ADJ]
BUSY
Q1
2SC4215
IF AMP
FI2
FL-224 (NARROW)
FL-210 (MIDDLE, WIDE)
BPF
21.80MHz
Q2
3SK177
BPF
Q3
2SK302
RF AMP
BPF
D8 MA77
D5 MA862
ANT SW
LPF
[ANT]
BUFFER
REM
(to MAIN unit)
Q17
2SC4117
REF OSC
12.8MHz
X3
CR-507
114.2-
152.2MHz
D9, D10 MA77
LO SW
Q13
2SC4405
RF AMP
Q14
2SC2954
DRIVE AMP
IC3
SC-1142 (L BAND)
SC-1301 (H BAND)
PWR AMP
APC DET
D11 HSU88
D2 HVU350
Q7, Q8 2SB1132
Q18 FMS1
Q19 2SC4116
APC CONTROL
UNLK
PLL IC
IC2
M64073GP
LPF
Q9
2SC4403
BUFFER
Q4 2SK880
Q5 2SC4117
LOOP FILTER
D15 MA111
SHIFT SW
Q4 DTC144
D1 MA77
SHIFT CONTROL
Q1, Q2
2SC4226
VCO
Q3
2SC4403
BUFFER
Q12
2SC4403
BUFFER
VCO BOARD
MOD
Q16 DTA114
+5SC
SW
Q11 2SC4081
RIPPLE FILTER
H/L
VCC
SW]
[EXT MIC]
[EXT SP/CLONE]
NOISE FILTER
[BATTERY PACK]
CONNECT
UNIT
RX
TX
COMMON
DATA BUS

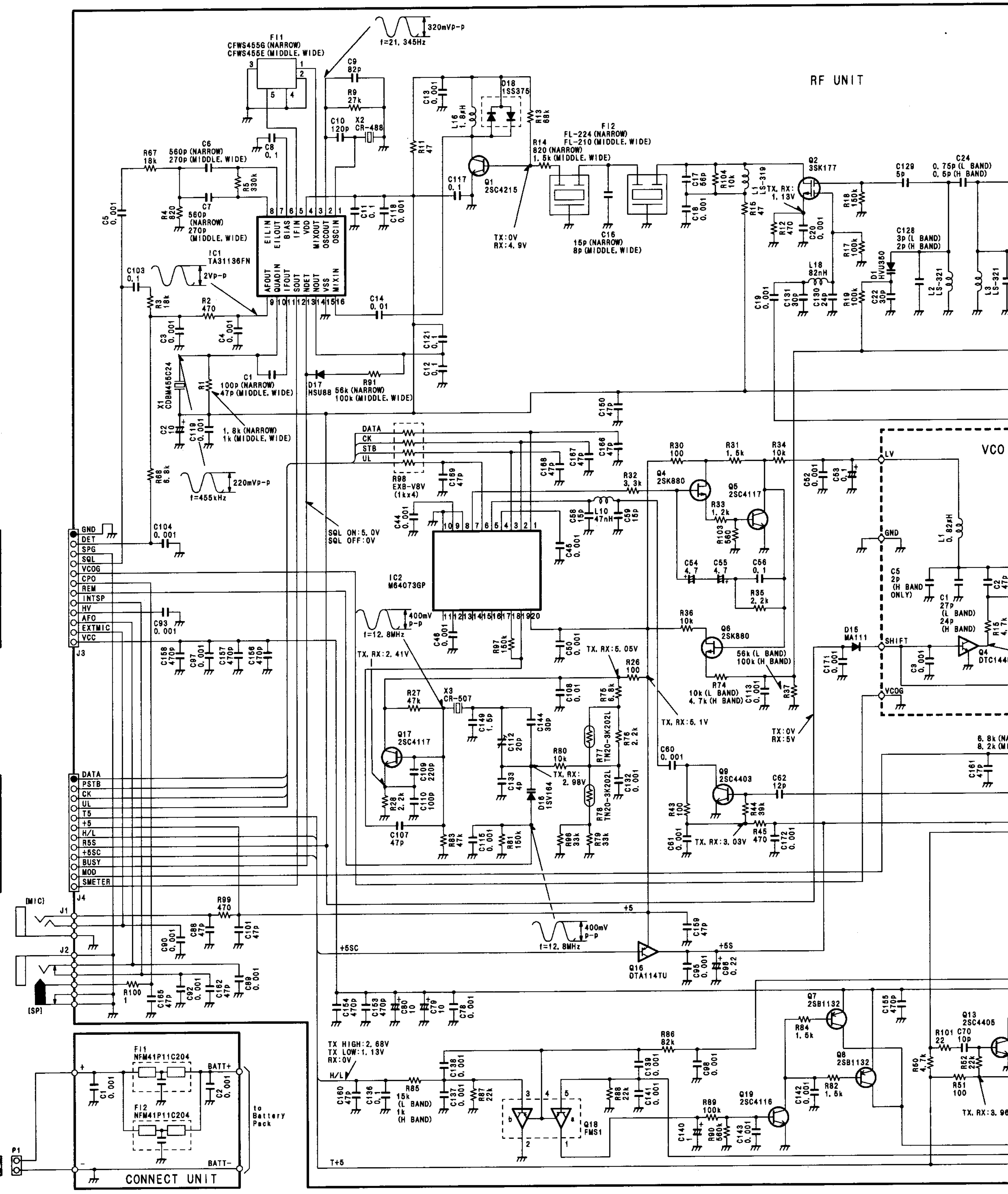

LOGIC-A UNIT
DS1
LD-BU5703J
IC1
HD404618C92H
IC2
24LC08BTI/SN
IC3
S-80740SL
LIGHT ON:0.6V
LIGHT OFF:5.1V
DS2
SML-110MT
DS3
SML-110MT
Q1
DTA114EU
Q2
DTC114EU
Q4
DTC114EU
D1
1SS353
D2
MA111
Q3
2SC4211
Q6
2SA1622
X1
CSB800J220
TX, RX:3.2V
TX, RX:2.1V
TX, RX:1.1V
5.0V
p-p
f=800kHz
TX:4.6V
RX:0V
TX:4.0V
RX:4.8V
TX:3.8V
RX:4.9V
SP1
MC1
J1
J2
J8
PTT UNIT
[MON1]
[LIGHT]
[FUNC]
[PTT]
SCK
SI
SO
CS
CPO
GND
T5C
S SW
IRQ
DTMF
DTAF
TSQL
BUSY/UNLK
PTT IN
+5
PTT OUT
ISTB
CK
DATA
PSTB
SPG
SP
GND
EXTMIC
for
OPTION



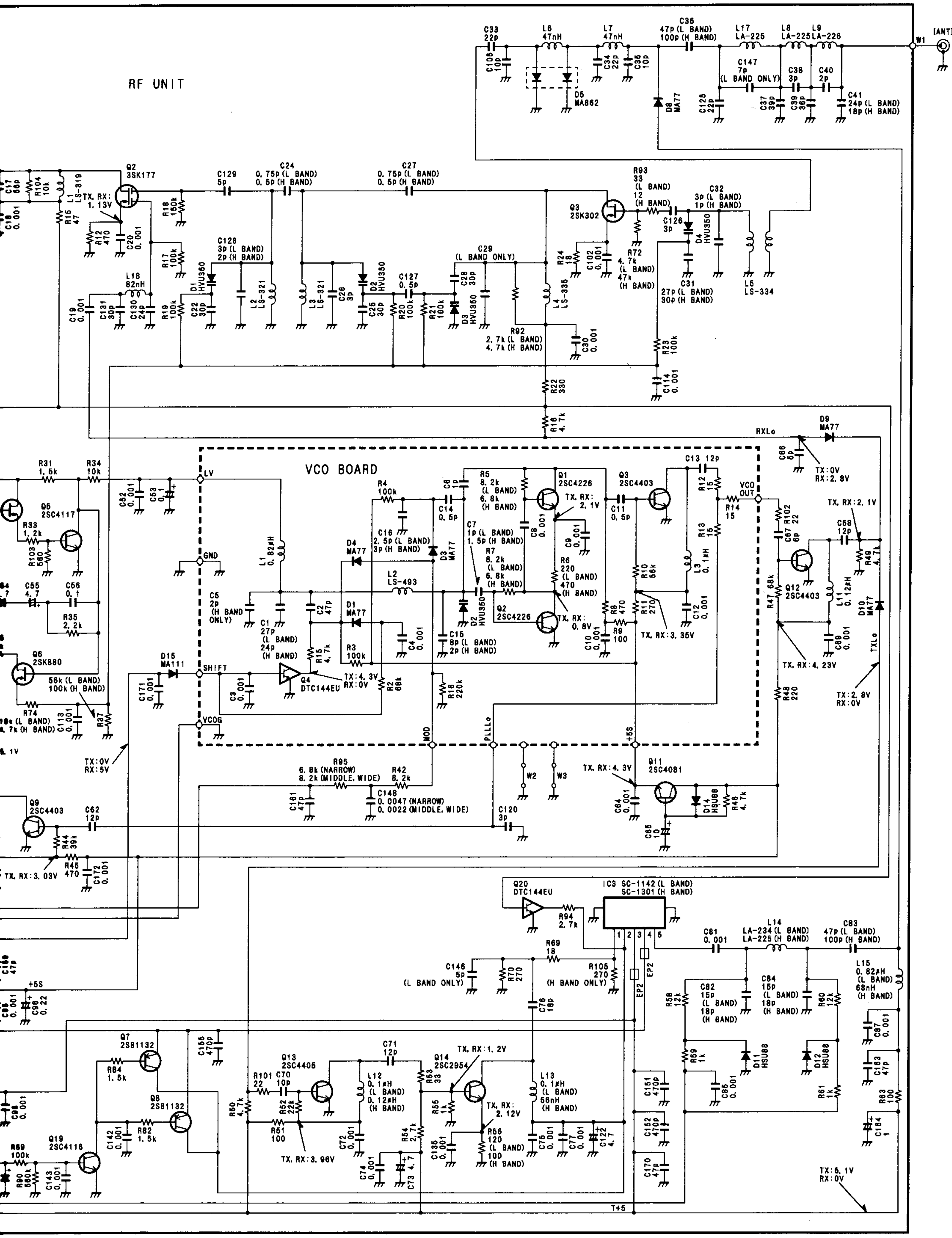
MAIN UNIT
J5
for OPTION
IC1 µPC5023GR
IC2 S-81252PG
IC3 BU4094BCF
IC4 TA7368F
IC7 TA75S01F
Q1 2SJ144
Q2 DTA14
Q4 XP1501
Q5 2SB1132
Q6 2SC4081
Q7 DTA114TU
Q8 2SB1201
Q9 XP1501
Q10 2SJ144
D1 1SS357
D2 1SS353
D3 1SS353
D4 1SS353
R10 39k
C9 0.022
C11 0.022
C75 0.0022
R83 12k
R13 100k (LMR) 120k (PMR/NARROW) 150k (PMR/MIDDLE, WIDE)
R49 330k
C2 4.7
27k (NARROW) 33k (MIDDLE, WIDE)
0.0033 (NARROW) 0.0018 (MIDDLE, WIDE)
120p (NARROW) 82p (MIDDLE, WIDE)
R84 4.7k (NARROW) 2.7k (MIDDLE, WIDE)
TX:5.1V RX:0V
W5
W6
R86 47k
MOD
R61 100
VCC
VCOG
LOW
TX, RX: 5.2V
TX, RX: 4.65V
TX:5.0V RX:0V
ISTB
DATA
CK
MMUTE
AFON
AFMUTE
STRB
CLK
VDD
OENA
VSS
+5SC
R5SC
AF ON:4.7V AF OFF:0V
AF ON:6.7V AF OFF:0V
C45 470p
C21 0.1
R23 1k
C22 220
SPG
AFO
MUTE ON:4.7V MUTE OFF:0V
R87 82k
R52 100k
C32 0.1
TX:0V RX:2.2V
C36 0.01
C37 0.047
R36 8.2k
TONE OUT
R37 1.2k (NARROW) 820 (MIDDLE, WIDE)
R40 8.2k
S1
W3
W4
SCK
SI
SO
CS
CPO
GND
T5C
S SW
IRQ
DTMF
DTAF
TSQL
BUSY/UNLK
PTT IN
+5
PTT OUT
ISTB
CK
DATA
PSTB
SPG
SP
GND
EXTMIC
J2
J8
J4



MAIN UNIT
C64 1
CTCSS TONE:
OFF 0V
ON 3.0V p-p
f≈3.6864MHz
C51 22p
X1 CR-465
R76 1M
C50 22p
R77 47k
C9 0.022
Q1 2SJ144
W1
R11 8.2k
R85 100k
C84 47p
C86 47p
C11 0.022
R15 1k
R12 180k
C75 0.0022
R83 12k
IC7 TA75S01F
C76 47p
C73 4.7
C74 4.7
R84 4.7k (NARROW) 2.7k (MIDDLE, WIDE)
C83 47p
C93 470p
C41 0.1
C109 47p
D4 1SS353
TX:5.1V RX:0V
W5
W6
R86 47k
MOD
Q2 DTA144EU
Q3 DTC144TU
C85 470p
+5
SDATA
CK
TSQL
DETO
TONE OUT
ISTB
TONE OUT
R66 220k
C54 150p
R65 22k
C61 0.001
C87 470p
IC6 AK2341
C88 47p
C59 0.022 (NARROW) 0.033 (L BAND/MIDDLE, WIDE) 0.039 (H BAND/MIDDLE, WIDE)
R67 15k
R68 150k
R74 56k (NARROW) 27k (MIDDLE, WIDE)
R71 22k
R72 3.9k
C89 47p
R75 330k
C57 1
C58 1
R73 47k
CTCSS TONE:ON
RX 0V
TX 1.0Vp-p
67~254.1Hz
C90 47p
C55 100p
R69 270k
R70 5.6k
C56 4.7
C91 47p
R61 100
D1 1SS357
IC2 S-81252PG
VCC
C46 4.7
C14 0.001
C15 0.001
C16 33
C107 47p
C92 470p
R46 10k
GND DET SPG SQL VCOG CPO REM INTSP HV AFO EXTMIC VCC
J2
C53 10
C52 0.1
Q7 DTA114TU
C19 0.001
R5S
C20 1
TX, RX:5.2V
VCOG
TX:5.1V RX:0V
R18 470
Q11 2SC4211
Q12 2SB1132
C38 4.7
C39 0.001
TX:4.6V RX:0V
D5 1SS353
TX:5.2V RX:0V
R19 2.2k
C40 0.22
C42 0.001
TX HI:0V TX LOW:5.2V
Q16 DTC144EU
R55 8.2k
R54
LOW
C104 470p
C111 470p
DATA PSTB CK UL T5 +5 H/L R5S +5SC BUSY MOD SMETER
J3
VCC
Q8 2SB1201
AF ON:6.7V AF OFF:0V
C29 0.1
C30 68
R28 1.8k
Q14 DTC144TU
SPG
AFO
C34 0.001
TONE OUT
R36 8.2k
AFO AFIN GND
R1
VCC
HV
VR BOARD
J1
CFWS4
R67 18k
C6 560p (NARROW) 270p (MIDDLE, WIDE)
C5 0.001
R4 820
C7 560p (NARROW) 270p (MIDDLE, WIDE)
IC1 TA31136FN
C103 0.1
2Vp-p
R3 18k
R2 470
C3 0.001
C4 0.001
X1 CDBM455C24
R1
100p (NARROW) 47p (MIDDLE)
C2 10
C119 0.001
1.8k (NARROW) 1k (MIDDLE)
R68 6.8k
f=455kHz
220mV
C104 0.001
GND DET SPG SQL VCOG CPO REM INTSP HV AFO EXTMIC VCC
J3
C93 0.001
C158 470p
C97 0.001
C157 47p
DATA PSTB CK UL T5 +5 H/L R5S +5SC BUSY MOD SMETER
J4
[MIC]
J1
R99 470
C90 0.001
C88 47p
J2
R100 1
C165 47p
C92 0.001
C162 47p
[SP]
F11 NFM41P11C204
BATT+
C1 0.001
C2 0.001
F12 NFM41P11C204
BATT-
P1
CONNECT UNIT



RF UNIT
VCO
CONNECT UNIT
FI1
CFWS455G (NARROW)
CFWS455E (MIDDLE, WIDE)
IC1
TA31136FN
IC2
M64073GP
Q1
2SC4215
Q2
3SK177
Q4
2SK880
Q5
2SC4117
Q6
2SK880
Q9
2SC4403
Q16
DTA114TU
Q17
2SC4117
Q18
FMS1
Q19
2SC4116
Q7
2SB1132
Q8
2SB1132
Q13
2SC4405
D18
1SS375
D17
HSU88
D16
1SV164
D15
MA111
D1
HVU350
X1
CDBM455C24
X2
CR-488
X3
CR-507
FI2
FL-224 (NARROW)
FL-210 (MIDDLE, WIDE)
R98
EXB-V8V
(1kx4)
f=21.345Hz
320mVp-p
2Vp-p
220mVp-p
f=455kHz
400mV p-p
f=12.8MHz
SQL ON: 5.0V
SQL OFF: 0V
TX: 0V
RX: 4.9V
TX, RX: 2.41V
TX, RX: 5.05V
TX, RX: 5.1V
TX, RX: 2.98V
TX, RX: 3.03V
TX: 0V
RX: 5V
TX HIGH: 2.68V
TX LOW: 1.13V
RX: 0V
GND
DET
SPG
SQL
VCOG
CPO
REM
INTSP
HV
AFO
EXTMIC
VCC
J3
DATA
PSTB
CK
UL
T5
+5
H/L
R5S
+5SC
BUSY
MOD
SMETER
J4
[MIC]
J1
J2
[SP]
+5
+5SC
+5S
T+5
LV
SHIFT
FI1
NFM41P11C204
FI2
NFM41P11C204
BATT+
BATT-
to Battery Pack
P1



RF UNIT
VCO BOARD
[ANT]
W1
Q2 3SK177
Q3 2SK302
Q5 2SC4117
Q6 2SK880
Q9 2SC4403
Q7 2SB1132
Q8 2SB1132
Q19 2SC4116
Q13 2SC4405
Q14 2SC2954
Q11 2SC4081
Q12 2SC4403
Q20 DTC144EU
IC3 SC-1142 (L BAND)
SC-1301 (H BAND)
D5 MA862
D8 MA77
D9 MA77
D10 MA77
D11 HSU88
D12 HSU88
D14 HSU88
D15 MA111
L1 LS-319
L2 LS-321
L3 LS-321
L4 LS-335
L5 LS-334
L6 47nH
L7 47nH
L8 LA-225
L9 LA-226
L17 LA-225
L14 LA-234 (L BAND) LA-225 (H BAND)
L15 0.82μH (L BAND) 68nH (H BAND)
L18 82nH
RXLo
TXLo
LV
GND
SHIFT
VCOG
MOD
PLLLo
+5S
T+5
VCO OUT
W2
W3
EP2
Q1 2SC4226
Q2 2SC4226
Q3 2SC4403
Q4 DTC144EU
L2 LS-493
TX, RX: 1.13V
TX, RX: 2.1V
TX, RX: 0.8V
TX, RX: 3.35V
TX, RX: 4.23V
TX, RX: 4.3V
TX: 4.3V RX: 0V
TX: 0V RX: 2.8V
TX: 2.8V RX: 0V
TX: 0V RX: 5V
TX, RX: 3.03V
TX, RX: 3.96V
TX, RX: 1.2V
TX, RX: 2.12V
TX: 5.1V RX: 0V
R95 6.8k (NARROW) 8.2k (MIDDLE, WIDE)
C148 0.0047 (NARROW) 0.0022 (MIDDLE, WIDE)

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